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INDEX

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General Index

Aberdeen, Sewer Cleaning in..... 97
Activated Plants, Handling Sludge from 508
Sludge Process for Stock Yards..377
Sludge, Removing 382
Administrative Work at Camp Merritt 602
Advertisements Regulated in Panama.512
Advertising Paving in Chicago..... 53
Air Drills for Removing Pavement Surfaces 153
in Street Excavating and Tamping, Compressed 108
Akron, Water Works Management in. 58
Alleys in Baltimore, Paving Private..602
Alleys in Minneapolis.....555
Apparatus in Service, Fire.....534
Appliances in Waterbound Macadam Construction 301
Owned by Highway Authorities..253
Aqueduct, Earthquake Breaks Los Angeles 77
Army Cantonments, Building the..... 21
Asphalt Block Pavements on Sand... 509
for Concrete Roads, Emulsified...130
on Country Roads, Sheet.....349
A. S. M. I. Convention Postponed..... 9
During the War..... 78
Autos Pay for Road System, Making.261

Baby Carriages and Gutters.....309
Carriages and Street Crossings..304
Baltimore, Paving Private Alleys in..602
Benefits, Firemen's Pensions and.514, 533
Beverly, Topographic Map for.....200
Bexley, Street Planning and Construction in 323
Bituminous Surface Treatment in Philadelphia 6
Bond City, Another Liberty.....483, 604
Bonding Plan, Illinois Highway.....485
Bonds and Liberty Bonds, Municipal.487
Bonus System, Speeding Up Concrete Road Job by.....373
Boston Metropolitan District, Use of Meters in 305
Bradford, England, Trackless Trolley at 375
Bridge Maintenance in Philadelphia. 28
Paints, Service Tests on..... 58
Bridges, Low Water Concrete.....128
Bridging Drainage Ditches.....197
Buffalo's Water Waste, Reducing....289

Calumet Intercepting Sewer, Work on.178
Camden's Electrically Operated Pumps 357
Camp Merritt as a Construction Problem 575,602
Camp Merritt, Administrative Work at 602
Cans, Utilizing Old Tin.....193
, Utilizing waste..... 8
Cantonment at Louisville, Ky., Building the 133
Cantonments, Building the..... 54
, Building the Army..... 21
, Sanitation in the..... 31
Car and Trailer, Utility.....154
Catch Basin Cleaning in Chicago.....625
Basins in Fitchburg, Cleaning....178
Caterpillar in Road Construction, The. 79
in Road Work, The.....110
Census in Iowa, Road.....252
Charges for Public Utilities, Service..581
Charleston, Sewage Pumping in.....399
Chicago, Advertising Paving in..... 53
, Catch Basin Cleaning in.....625
Motor Truck Operation Records in 306
, Sewer Construction in.....350
Chlorine for Water Sterilizing, Electrolytic Cell 30
Cincinnati, High Pressure Fire System of 597, 628
, Street Cleaning in.....423
Cleaning in Cincinnati, Street.....423
Coal and Public Utilities.....535
in the Waterworks Pumping Station, Saving 49
Columbus, River Channel Improvement at 155
Competition for Public Work.....199
Compton Hill Reservoir, Reconstructing 224
Concrete, Breaking up.....259
, Covered Reservoir of Reinforced 26
Highway Construction in Illinois.505
Pavements, Concealed Joints in..581
Pavements, Cracks in.....580
Pavements, Maintenance of.....248
Pavements, Spool Roller for.....483
Paving in Savannah, Cost of.....599
Paving, Labor-Saving Devices on.107
Paving on Connecticut Highway..149
Reservoirs, Lansing 220
, Resurfacing an Old Road with..250
Road Building, Machinery Replaces Men on..... 95
Road Construction, New Jersey..335
Road Job by Bonus System, Speeding Up 373
Roads, Handling Aggregate for..354
Streets, Board Float for Finishing 484
Water Tank and Tower.....511
With New, Resurfacing Old.....130
Connecticut Highway, Widening and Straightening a 245
Connections Preliminary to Paving, House 399
Contractors' Materials and Motor Trucks 560
Construction Must Continue, Road...535
Work on Du Pont Road..... 91
Contract on Cost-Plus-Fixed-Sum Basis, Sewer 288
Contracts, Cost-Plus-A-Fixed-Sum...287
, Cost-Plus-Graded-Percentage...288
, Cost-Plus-Percentage 257
Contractors the Burden Bearers.....487
Convention of the New England Water Works Association.....279
of Street Cleaning Society, No..332
Convicts in Iowa, Road Work with...154
Copper Sulphate and Fish.....331
Sulphate, The Use of.....327
Cost of Laying Water Mains, The....328
of Public Work.....9, 199
Cost-Plus-Percentage Contracts, 257, 287, 288
Council of National Defence, The..... 7
County Highway Data, Town and....256
Cracks in Concrete Pavements.....580
Curb Corner, Lengthening Radius of..333
Curbs, Street Names in.....310
Curves of Ohio Roads, Improving the.356
Cuts in Pavements, Making.....424

Depreciation Charges, Decreasing Plant 309
Detroit Water Department Truck... 51
Dirt Roads and the War.....536
Ditches, Bridging Drainage.....197
Draughtsmen and Mechanics Wanted.401

Easton, Electrolytic Sewage Treatment in 514
Economy, Preparedness and.....109
Editorial Representative, Our Western 79
Electric Rates in Los Angeles, Low..511
Works, Wallingford Municipal...556
Electrically, Heating Water.....512
Electricity, Stimulating Domestic Use of 481
Electrolytic Cell Chlorine for Water Sterilizing 30
Sewage Treatment in Easton....514
Embargo, The Road Material.....513
Employees, Hints from.....222
Engineering Council, The..... 25
Engineers, The Demand for.....177
Erie's Garbage Decreasing.....278
Everglades, Building Roads in the...531
Excavating in Shallow Cut.....327
, Steam Shovel in Street.....399
Explosives, Handling 484

Filter, Handling Stone for a Sprinkling 197
Filters, Operating the St. Louis.....150
, Roof Construction for Reservoir and 309
Filtration Plant, The New Brunswick 71
, Rapid Sand 307
Finances, Municipal Water Department 222
Fire Apparatus, Gasoline Consumption by 630
Apparatus in American Cities, Motor 582
Apparatus in Service.....534, 560
Apparatus Mileage 607
Apparatus, Mileage by Motor....583
Apparatus, Notes Concerning....558
Chiefs Wanted for France..... 32
Department Data (Tables)...452-464
Department Notes 464
Department Tables in This Issue.465
Hose, Relining Old.....150
Hydrants Into Shape, Get.....223
Marshal Department, Minnesota..534
Marshal Department of Ohio.....439
Marshal Laws, State.....466
Marshals, The State.....447
Prevention 442
Prevention and Patriotism.....465
Prevention, The New York Bureau of 443, 482
Prevention Number, Special.....401
Prevention Work 558
System of Cincinnati, High Pressure 597, 628
, The Time to Put Out a.....465
Firemen's Pensions and Benefits, 488, 514, 533
Fish and Copper Sulphate.....331
Fitchburg, Cleaning Catch Basins in.178
, Sewage Disposal at.....173
Float for Finishing Concrete Streets, Board 484
Flue Cleaning, Compulsory.....175
Flusher Displaces Laborers and Teams 99
in Vicksburg, Operation of Street.152
Forestry by New Britain Water Board 219
Freight Trains, Highway.....557
Freighting with Motor Trucks.....559

Garbage Decreasing, Erie's.....278
Disposal Report, Springfield.....125
in Portland, Selling.....558
, Utilizing 129, 381
Gasoline Consumption by Fire Apparatus 630
From Sewers, Excluding.....354
Glasgow, Waste-Paper, Collection in.607
"Good Roads' Orator's Handbook, A.177
Grade Crossings, Safer.....302
Grading Wrinkles, Some Road.....96
Great Falls Water Purification and Softening Plant 553
Greenwich Sewage Disposal Plant, The 621
Gutters and Baby Carriages.....309

Hartford, Electric Sprinkling Trucks in 150
Waterworks 304
Haulage Methods and Costs on Ohio Road Work 125
Hauling Road Gravel by Teams and Tractors 422
Health Department Laboratories.....157
Heating Water Electrically.....512
Henderson, Ultra Violet Sterilization at 330
Highway Authorities, Appliances Owned by 253
Bonding Plan, Illinois.....485
Construction in Illinois, Concrete 505
Highway Data, Town and County....256
Freight Trains 557
Funds, Indiana Apportions.....511
, Widening and Straightening a Connecticut 245
Work, Oregon 607
Highways, Fruit Trees for Shading..349
, High-Cost Pavements for Country 355
Holland, Mich., Cleaning Sewers in...194
House Connections Ahead of Paving, Placing 355
Houston, Street Cleaning in..... 94
Hydrants Into Shape, Get Fire.....223

Illinois, Concrete Highway Construction in 505
Highway Bonding Plan.....485
Indexing by Libraries.....401
Industrial Railways 105
Indiana Apportions Highway Funds.511
Indianapolis, Sewage Disposal for....510
Intake and Outflow Velocities.....426
Iowa, Experimental Roads in.....178
, Road Census in.....252
, Road Work with Convicts in...154
Iron Pipe Sewer in White Plains, Laying 479
Irrigation Water, Recovering.....375

Joints in Concrete Pavements, Concealed 581

Labor Available for Road Work..... 257
Problem, Solving the.....109
Labor-Saving Devices on Concrete Paving 107
Laboratories, Health Department....157
Lansing Concrete Reservoirs.....220
Laws, State Fire Marshal.....466
, State Motor Trucks.....196
Leak of 330 Gallons Per Capita Daily, A 278
License Fees in Wisconsin Cities....130
Lighting in Richmond, Street.....414
in Sioux Falls, Electric.....419
in St. Louis, Park.....125
Los Angeles Aqueduct, Earthquake Breaks 77
, Low Electric Rates in.....511
, Road Maintenance in.....277
Louisville, Ky., Building the Cantonment at 133

Macadam, Blowing Dust from.....175
Construction, Appliances in Waterbound 301
Construction, Machinery in.....398
Removing Old 252
Roads in Richmond, Maintaining.356
Machine Trenching for Water Pipes.. 94
Machinery in Macadam Construction.398
in Trenching 229
, Modern Roadmaking..... 97
on a New York Highway..... 99
Replaces Men on Concrete Road Building 95
Maintenance and Repair of Improved Roads 486
in Los Angeles, Road.....277
of Concrete Pavements.....248
Manager, Qualifications for City.....626
Manhole for Separate Sewers in Same Trench 173
Manholes for Sewers, Drop.....379
Map for Beverly, Topographic.....200
Market, Municipal Public.....194
Marshal Department of Ohio, Fire....439
Laws, State Fire.....466
Marshals, The State Fire.....447
Materials, Importance of Proper Use of 9
Meters in Boston Metropolitan District, Use of.....305
Miami River Improvement Contracts.402
Mileage, Fire Apparatus.....607
Mileage by Motor Fire Apparatus....583
Minneapolis, Alleys in.....555
Minnesota Fire Marshal Department.534
Motor Fire Apparatus in American Cities 582
Fire Apparatus, Mileage by.....583
Trucking, Pittsburgh to New York 604
Vehicles, Cost of Operating..... 78
Vehicles in Municipal Work.....101
Vehicles in Spokane City Work..106
Municipal Ownership is a Failure, Where 199

New Britain Water Board, Forestry by 219
New Brunswick Filtration Plant, The 71
New England Water Works Association, Convention of the.....279
and American Water Works Association Not Probable, Union of.287
New Jersey Concrete Road Construction 395
New York Area, Sewage Disposal for a 578, 600
Bureau of Fire Prevention...443,482
Highway, Machinery on a..... 99

Odors from Sewage Treatment Plants.623
Ohio, Fire Marshal Department of....439
Ohio Road Work, Haulage Methods and Costs on.....125
Roads, Improving the Curves of.356
Oiling Roads in Iowa.....124
Oklahoma's Regulation of Water Supplies and Sewerage..... 77
Operation, Importance of..... 57
of Sewage Treatment Plants....400
Oregon Highway Work.....607
Outflow Velocities, Intake and.....426
Paints for Metal Surfaces.....195
, Service Tests on Bridge..... 58
Parking in Cities.....125
Pasadena, City Planning in.....481
Patented Pavement, Federal Aid for..354
Patriotism, Fire Prevention and.....465
, Waterworks 223
Pavement, Applying Tar to Wood Block 98
Carries Heavy Traffic, Asphalt..128
, Faulty Construction of Wood Block 155
, Federal Aid for Patented.....354
Surfaces, Air Drills for Removing 153
Pavements, Concealed Joints in Concrete 581
, Cracks in Concrete.....580
for Country Highways, High-Cost 355
, Maintenance of Concrete.....248
Making Cuts in.....424
on Sand, Asphalt Block.....509
, Spool Roller for Concrete.....483
, Toothing Out Block..... 95
Paving Blocks, Using Old Stone.....176
, House Connections, Preliminary to 399
in Chicago, Advertising..... 53
in Savannah, Cost of Concrete...599
Materials, Injustice to.....157
on Connecticut Highway, Concrete 149
, Placing House Connections Ahead of 355
Private Alleys in Baltimore.....602
Pennsylvania, Emergency Road Construction in 76
Pensions and Benefits, Firemen's, 488, 514, 533
Philadelphia, Bituminous Surface Treatment in 6
, Bridge Maintenance in..... 23
, Underground Survey in..... 4
Piggeries, Community 133
Planning in Pasadena, City.....481
Plant Depreciation Charges, Decreasing 309
Plumbing as a Science..... 31
, Prizes for Papers on..... 29
Portland, Motor Trucks in.....228
, Selling Garbage in.....558
Postal Law Against Progress and United Sentiment, A.....627
Power and Water Bureau Shops of Los Angeles 131
Preparedness and Economy.....109
Publication Date, Change of.....582
Pumping Station, Saving Coal in the Waterworks 49
Pumps, Camden's Electrically Operated 357
Purchasing Bureau, San Diego.....304
Purification and Softening Plant, Great Falls Water.....553
Experiences, Some Water..... 52
Plants, Public Interest in.....157

Railroads for Water, Charging.....224
Rate Increases, Cities Resisting.....580
Revision in Municipal Works.285, 310
Rates in Los Angeles, Low Electric..511
, Lower Light and Water.....310
Refuse Collection Trucks, Electric... 32
Collection Wagons, Toronto's New 51
Reports, Improving Municipal 509
Resurfacing an Old Road with Concrete 250
Old Concrete with New.....130
Reservoir of Reinforced Concrete, Covered 26
, Reconstructing Compton Hill...224
Reservoirs and Filters, Roof Construction for.....309
, Lansing Concrete.....220
Richmond, Maintaining Macadam Roads in 356
, Street Lighting in.....424
River Channel Improvement at Columbus 155
Improvement Contracts, Miami..402
Road Building in Record Time.....247
Building, Machinery Replaces Men on Concrete..... 95
Census in Iowa.....252
, Constructing the Storm King...169
Construction in Pennsylvania, Emergency 76
Construction Must Continue.....535
Construction, New Jersey Concrete 395
Construction, The Caterpillar in.. 79
, Construction Work on Du Pont. 91
Experiments in Wisconsin, Sand.396
Road Grading Wrinkles, Some..... 96
Gravel by Teams and Tractors, Hauling 422
Job by Bonus System, Speeding Up Concrete 373
Maintenance in Los Angeles.....277
Markers 382
Material Delivery, Securing..... 54
Material Embargo, The.....513
Materials, Taking Stock of..... 78
Planer, Minnesota 198
Scrapers, Use of.....110
Signs in New Jersey.....626
System, Making Autos Pay for...261
With Concrete, Resurfacing an Old 250
Work, Haulage Methods and Costs on Ohio.....125
Work, Labor Available for.....257
Work, Organizing State.....558
Work, The Caterpillar in.....110
Work with Convicts in Iowa.....154
Roadmaking Machinery, Modern..... 97
Roads, A Test of War Trucks—and..605
Roads and the War, Dirt.....536
, Emulsified Asphalt for Concrete.130
, Handling Aggregate for Concrete 354
, Improving the Curves of Ohio...356
in France, Military..... 28
in Iowa, Experimental.....178
in Iowa, Oiling.....124
in the Everglades, Building.....531
, Maintenance and Repair of Improved 486
, Sheet Asphalt on Country.....349
, State Expenditures on Good.....330
, The Problem of Rural.....425
Roller for Concrete Pavements, Spool.483
Rural Roads, The Problem of.....425

San Diego Purchasing Bureau.....304
Water Department, Quick Work by 25
Sand Road Experiments in Wisconsin 396
Sanitation of Health Resorts..... 79
in the Cantonments..... 31
in the War, Military..... 73
Savannah, Cost of Concrete Paving in.599
, Municipal Work in.....532
Scrapers, Use of Road.....110
Sewage Disposal at Fitchburg.....173
Disposal for a New York Area, 578, 600
Disposal for Indianapolis.....510
Pumping in Charleston.....399
Testing Stations 420
Treatment in Easton, Electrolytic.514
Treatment, Machinery in.....381
Treatment Plant, The Greenwich.621
Treatment Plants, Neglect of....607
Treatment Plants, Odor from.....623
Treatment Plants, Operation of..400
Sewer Cleaning in Aberdeen..... 97
Construction in Chicago.....350
, Failure of Brick.....400
House Connections in Fitchburg..176
in White Plains, Laying Iron Pipe 479
Machine Infringement, Turbine...630
Work for Camp Taylor, Good....228
Work in Rock and Quicksand....123
, Work on Calumet Intercepting.176
Sewerage, Oklahoma's Regulation of Water Supply and..... 77
System for a Small Town.....529
Sewers, Drop Manholes for.....379
, Excluding Gasoline from.....354
in Chicago, Cleaning.....308
in Holland, Mich., Cleaning.....194
in Same Trench, Manhole for Separate 173
Signs in New Jersey, Road.....626
Sinking Funds, Liberty Bonds for, 381, 401
Sioux Falls, Electric Lighting in.....419
Sludge from Activated Plants, Handling 508
Snow and Street Traffic.....605
Societies, State Federations of Technical 32
Softening Plant, Great Falls Water Purification and 553
Spokane City Work, Motor Vehicles in 106
Springfield Garbage Disposal Report.125
Sprinkling Truck in Hartford, Electric 150
Standpipe, Burning Off a.....401
Sterilization at Henderson, Ultra Violet 330
Sterilizing, Electrolytic Cell Chlorine for Water 30
St. Louis Filters, Operating the.....150
, Laying Steel Water Main in...347
, Park Lighting in.....125
Stock Yards, Activated Sludge Process for 377
Stone for a Sprinkling Filter, Handling 197
Storm King Road, Constructing the..169
Street Cleaning in Cincinnati.....423
Cleaning in Houston..... 94
Cleaning Society, No Convention of 332
Excavating, Steam Shovel in.....399
for Increased Traffic, Widening a.230
Planning and Construction in Bexley 323
Traffic, Snow and.....605
Streets, Clay-Gravel for.....423
Students and the War, Technical....287
Survey in Philadelphia, Underground 4
Surveying Roads, The Cost of.....333
Tables in This Issue, Fire Department 465
Tamping, Compressed Air in Street Excavating and 108
Tank and Tower, Concrete Water....511
Tar to Wood Block Pavement, Applying 98

Testing Stations, Sewage....420
Touching Out Block Pavements....95
Toronto's New Refuse Collection Wagons....51
Town and County Highway Data....256
Traffic, Asphalt Pavement Carries Heavy....128
Regulation at Right-Hand Turns....303
Traffic, Widening a Street for Increased....230
Trees for Shading Highways, Fruit....349
Trenching at Low Cost....423
for Water Pipes, Machine....94
, Machinery in....229
Trenton Water Works Notes....178
Trolley at Bradford, England, Trackless....375
Truck Design, The New War....510
, Detroit Water Department....51
Laws, State Motor....196
Operation Records in Chicago, Motor....306
Trucking, Pittsburgh, to New York, Motor....604
, A Test of War.—And Roads....605
Trucks, Contractors' Materials and Motor....560
, Electric Refuse Collection....32
, Freighting with Motor....559
in Portland, Motor....228
Typhoid, Automobile....129

Ultra Violet Sterilization at Henderson....330
Underpass Abolished, Dangerous....332
Utilities, Coal and Public....535
, Service Charges for Public....581
Viaduct, The Chouteau Avenue....417
Vicksburg, Operation of Street Flusher in....152
Vitrified Water Conduit, Experience with a....1

Wallingford Municipal Electric Works....556
Waltham Water Works Notes....219
War, Dirt Roads and the....536
Industries, How Cities May Obtain....623
, Military Sanitation in the....73
Necessities, Municipal Work and....606
, Technical Students and the....287
Time, Public Work in....57
Waste Cans, Utilizing....8
Paper, Collecting....382
Paper, Collection in Glasgow....607
Paper, Municipal....331
, Reducing Buffalo's Water....289
Wastes, Utilizing Trade....177
Water Bureau Shops of Los Angeles, Power and....131
, Charging Railroads for....224
Conduit, Experience with a Vitrified....1
Consumption Estimate....175
Consumption of Public Schools....129
Department Finances, Municipal....222
Department, Quick Work by San Diego....25
Main in St. Louis, Laying Steel....347
Mains, The Cost of Laying....328
Pipes, Machine Trenching for....94
Purification and Softening Plant, Great Falls....553
Purification Experiences, Some....52
Purity Determination by Correspondence....330
, Recovering Irrigation....375
Samples, Shipping....29
Sterilizing, Electrolytic Cell Chlorine for....30
Supplies and Sewerage, Oklahoma's Regulation of....77
Supply in the U. S., Sources of....53
Supply, Recent Improvements in Wilmington's....213
Supply, Sources of....57
Waste, Reducing Buffalo's....289
Works Association, Convention of the New England....279
Works, Hartford....304
Works Management in Akron....58
Works Notes, Trenton....178
Works Notes, Waltham....219
Works Patriotism....223
Works Pumping Station, Saving Coal in the....49
Works Statistics....4
White Plains, Laying Iron Pipe Sewer in....479
Widening a Street for Increased Traffic....230
Wilmington's Water Supply, Recent Improvements in....213
Wisconsin Cities, License Fees in....130
, Sand Road Experiments in....396
Wood Block Pavement, Faulty Construction of....155
Work and War Necessities, Municipal....606
Work, Cost of Public....9, 199
in War Time, Public....57

News of the Municipalities

ROADS AND PAVEMENTS.

Albany, N. Y....633
Ames, Ia....53
Atlanta, Ga....456
Augusta, Me....10
Austin, Tex....33, 80, 201, 541
Baltimore, Md....33, 111, 333
Bismarck, N. D....541
Boise, Idaho....111
Boston, Mass....158, 497
Carson City, Nev....158, 586
Charleston, W. Va....290, 311
Charlottesville, Va....175
Cheyenne, Wyo....202
Chicago, Ill....518
Cleveland, O....564
Colorado Springs, Colo....200
Columbus, O....290, 426, 561
Des Moines, Ia....232
Detroit, Mich....158, 201, 353
Harrisburg, Pa....134, 201, 232, 262, 334, 564, 586
Helena, Mont....586
Indianapolis, Ind....125, 564
Jefferson, Ia....33, 353
Johnstown, Pa....404
Lansing, Mich....59, 153
Lincoln, Neb....86
Madison, Wis....134, 610
Mineola, Mo....439
Minneapolis, Minn....354
Montclair, N. J....467
Nashville, Tenn....311
New Haven, Conn....641
New York, N. Y....81, 383, 439
Ogden, Utah....80, 635
Philadelphia, Pa....265
Pierre, S. D....311
Portland, Ore....134
Portsmouth, Va....401
Providence, R. I....59
Raleigh, N. C....393
Sacramento, Cal....201, 358, 490, 518
Salem, Ore....59, 311, 427, 467, 610
San Antonio, Tex....10
San Jose, Cal....404
Scranton, Pa....633
Springfield, Ill....10, 230
Springfield, O....201
Topeka, Kan....34, 252
Trenton, N. J....232, 334, 427, 490, 541
Washington, D. C....33, 59, 158, 179, 467, 518, 610
Wilkes-Barre, Pa....311
Wrightstown, N. J....541
York, Pa....111, 179

SEWERAGE AND SANITATION.

Albany, N. Y....401
Alexandria, La....543
Atlantic City, N. J....359
Augusta, Me....159, 384
Baltimore, Md....82
Bath, Mich....35
Battle Creek, Mich....312
Bay City, Mich....429
Boston, Mass....468, 543, 611
Bradford, England....11
Burlington, N. J....405
Canton, O....634
Charleston, W. Va....180, 313, 353
Chester, Pa....233
Chicago, Ill....312, 358
Chisholm, Minn....429
Cincinnati, O....519, 586
Cleveland, O....519
Columbus, O....35, 202, 468, 587
Dayton, O....313
Easton, Pa....519
Eddystone, Pa....233
Fargo, N. D....135
Fort Worth, Tex....611
Gettysburg, Pa....233
Goldsboro, N. C....180
Haddonfield, N. J....565
Hammond, Ind....112
Hamtramck, Mich....611
Harrisburg, Pa....565
Hartford, Conn....335, 384, 481, 587
Hattiesburg, Miss....203
Houston, Tex....293
Indianapolis, Ind....518
Iowa City, Ia....135
Jackson, Miss....60
Jersey City, N. J....291
Johnstown, Pa....179, 404, 542
Joliet, Ill....263
Lancaster, O....384
Lawrence, Mass....565
Meyersdale, Pa....565
Milwaukee, Wis....11, 112, 263, 429
Minneapolis, Minn....359, 519
Montgomery, Ala....428
Murphysboro, Ill....359
Newark, N. J....34, 82, 135, 203, 358, 491
New Orleans, La....11
Newport, R. I....159
New York, N. Y....60, 60, 263, 264, 291, 291, 312, 335, 542
Oklahoma City, Okla....139
Peabody, Mass....159
Philadelphia, Pa....611
Phillipsburg, N. J....565
Pompton Lakes, N. J....244
Ravenna, O....429
Reno, Nev....512
Richmond, Va....159
Rochester, Minn....429
Rochester, N. Y....112
Sacramento, Cal....202, 291, 611
Salem, O....519
San Antonio, Tex....112
South Bend, Ind....312, 359, 428, 492
St. Paul, Minn....542
Tacoma, Wash....463
Taylorville, Ind....137
Tokio, Japan....112
Toledo, O....233, 519
Trenton, N. J....565
Washington, D. C....34, 60, 81, 135, 159, 202, 245, 384, 542, 542, 634
Washington, N. J....565
Watervliet, N. Y....519
Webster City, Ia....611
Wilkes-Barre, Pa....81
Winston-Salem N. C....563

WATER SUPPLY.

Aberdeen, Wash....360
Akron, O....234
Albany, N. Y....386
Ann Arbor, Mich....612
Atlantic City, N. J....565
Bangor, Me....544
Bayonne, N. J....136
Belfast, Me....529
Bristol, Tenn....565
Canton, O....136, 336
Charleston, W. Va....204, 234
Clayton, Mo....293
Cleveland, O....543
Columbus, O....492
Cozad, Neb....82
Dallas, Ore....405
Dallas, Tex....566
Danbury, Conn....139
Denver, Colo....83, 385, 450
Flint, Mich....31
Ft. Worth, Tex....60
Hamilton, O....520, 543
Lakefield, Minn....612
Larkspur, Colo....91
Lawrence, Kan....113
Lincoln, Neb....160, 519
Livingston, Mont....11, 405
Los Angeles, Cal....160
Mansfield, O....314
Meridian, Miss....314
Newark, N. J....313, 360, 430, 634
New Brunswick, N. J....189
Newport News, Va....430
New York, N. Y., 35, 113, 360, 385, 405, 469, 469
Niagara Falls, N. Y....493
Norfolk, Va....386
Oakland, Cal....113
Orange, N. J....265
Oshkosh, Wis....254
Philadelphia, Pa....160
Pittsburgh, Pa....405
Portland, Ore....469
Portsmouth, Va....536
Providence, R. I....82
Reading, Pa....566
Reno, Nev....292
Reynoldsville, Pa....631
Rochester, Pa....529
Rutherford, N. J....634
San Diego, Cal....385
San Francisco, Cal., 35, 113, 204, 264, 292, 314, 612
Savannah, Ga....386
South Bend, Ind....336
Spokane, Wash....11
Springfield, Ill....160, 264
Syracuse, N. Y....292
Texarkana, Ark....61
Trenton, N. Y....136, 293
Washington, D. C....336, 612
Windsor, Ont....493

STREET LIGHTING AND POWER.

Bluefield, W. Va....635
Boston, Mass....83, 635
Bronxville, N. Y....566
Charleston, W. Va....131
Chicago, Ill....12
Chillicothe, O....336
Cincinnati, O....204, 587
Cleveland, O....587
Columbus, O....36, 83
Dallas, Tex....406
Eaton Rapids, Mich....587
Edmonton, Alta....295
Elmira, N. Y....406
Flemington, N. J....265
Ft. Worth, Tex....387
Gary, Ind....131
Groton, N. Y....566
Harrisburg, Pa....114
Hope, Ind....431

Indianapolis, Ind., 114, 136, 292, 315, 469, 544, 61[illegible]
Jefferson City, Mo. 2[illegible]
Kansas City, Kan. 61 1[illegible]
Leeds, England 2[illegible]
Lima, O. 2[illegible]
London, England 1[illegible]
Los Angeles, Cal. 2[illegible], 315, 6[illegible]
Marshalltown, Ia. 470
Menasha, Wis. 2[illegible], 3[illegible]
Monroe, Mich. 5[illegible]
Montpelier, O. 1[illegible]
Morgantown, W. Va. 6[illegible]
New Bedford, Mass. 61
New York, N. Y. 12, 161, 181, 298, 3[illegible]
Niagara Falls, Ont. 161, 3[illegible]
Oroville, Cal. 1[illegible]
Oshkosh, Wis. 361
Pine Bluff, Ark. 3[illegible]
Pittsburgh, Pa. 6[illegible]
Providence, R. I. 3[illegible]
Rochester, Minn. 5[illegible]
San Francisco, Cal. 3[illegible]
Seattle, Wash. 4[illegible]
Springfield, Ill. 5[illegible]
Stockholm, Sweden 61
St. Louis, Mo. 3[illegible]
Tacoma, Wash. 1[illegible]
Toronto, Ont. 1[illegible]
Trenton, N. J. 36, 113, 431
Washington, D. C. 234, 360, 544, 566, 6[illegible]
Waterville, N. Y. 1[illegible]
Wilkes-Barre, Pa. 235
Williams, Ariz. 3[illegible]
Wilson, Kan. 31

FIRE.

Albany, Ore. 521
Astoria, Ore. 521
Atlanta, Ga. 115
Atlantic City, N. J. 472, 636
Attleboro, Mass. 614
Baltimore, Md. 362, 472
Berkley, Va. 407
Biddeford, Me. 522
Boston, Mass. 236, 4[illegible]
Bristol, Va. 316
Buffalo, N. Y. 471
Champaign, Ill. 4[illegible]
Charleston, W. Va. 47[illegible]
Cleveland, O. 83, 472, 521
Columbus, O. 1[illegible], 6[illegible]
Denver, Colo. 3[illegible]
Duluth, Minn. 3[illegible]
East St. Louis, Ill. 362, 388
Elmira, N. Y. 4[illegible]
Fitchburg, Mass. 2[illegible]
Fresno, Cal. 614
Gary, Ind. 361
Groton, S. D. 362
Halifax, N. S. 588
Harrisburg, Pa. 3[illegible]
Harrison, Idaho 115
Hartford, Conn. 5[illegible]
Hollansburg, O. 137
Homer City, Pa. 407
Indianapolis, Ind. 162
Jersey Shore, Pa. 613
Juarez, Mex. 37
Kansas City, Mo. 407
Lawton, Okla. 361
Lebanon, Ind. 2[illegible]
Los Angeles, Cal. 266, 3[illegible]
Lowell, Mass. 494
Mansfield, O. 337
Mullens, W. Va. 635
Mer dian, Miss. 407
Newark, N. J. 3[illegible]
New Rochelle, N. Y. 5[illegible]
New York, N. Y. 62, 181, 206, 266, 388, 388, 432, 493, 494, 520, 588, 614, 636
Norwalk, Conn. 546
Osceola, Ia. 5[illegible]
Paterson, N. J. 471, 614
Philadelphia, Pa. 138, 472, 522
Plains, Pa. 3[illegible]
Portland, Ore. 337
Punxsutawney, Pa. 614
Rochester, N. Y. 115
Salem, Ore. 182
San Antonio, Tex. 37, 83
San Francisco, Cal. 389, 473, 494, 588
San Jose, Cal. 2[illegible]
Schenectady, N. Y. 407
Shreveport, La. 182, 636
Sioux City, Ia. 3[illegible]
Springfield Ill. 1[illegible]
St. Hyacinthe, Que. 5[illegible]
St. Louis, Mo. 13[illegible]
St. Paul, Minn. 283, 389
Sumpter, Ore. 205
Tacoma, Wash. 283, 471
Traverse City, Mich. 43[illegible]
Tulsa, Okla. 17[illegible]
Vancouver, B. C. 62
Walla Walla, Wash. 1[illegible]
Washington, D. C. 5[illegible]
Yonkers, N. Y. 31[illegible]

POLICE.

Atlanta, Ga. 56[illegible]
Battle Creek, Mich. 23[illegible]
Chicago, Ill. 162, 521
Cleveland, O. 521
Columbia, S. C. 521
Columbus, Ga. 588
Columbus, O. 614
Des Moines, Ia. 23[illegible]
Detroit, Mich. 62
Duluth, Minn. 361
East St. Louis, Ill. 83, 205
Ft. Worth, Tex. 361
Harrisburg, Pa. 12, 13
Hattiesburg, Mass. 23[illegible]
Houston, Tex. 37, 588
Indianapolis, Ind. 13, 137, 162
Kansas City, Mo. 266
Los Angeles, Cal. 567
Meridian, Miss. 407
Milwaukee, Wis. 56[illegible]
Montgomery, Ala. 236
New Orleans, La. 567
New York, N. Y. 614
Philadelphia, Pa. 587
Pine Bluff, Ark. 63[illegible]
Plattsburg, N. Y. 23[illegible]
Shreveport, La. 546
South Bethlehem, Pa. 162
St. Hyacinthe, Que. 58[illegible]
Terre Haute, Ind. 536
Washington, D. C. 235

MOTOR VEHICLES.

Akron, O. 13[illegible]
Chester, Pa. 15[illegible]
Emporia, Kans. 23[illegible]
London, England 266
Natchez, Miss. 4[illegible]
Newark, N. J. 473
Oak Park, Ill. 13[illegible]
Oswego, N. Y. 54[illegible]
Owosso, Mich. 26[illegible]
Provo, Utah 547
Sydney, N. S. 546
Syracuse, N. Y. 473
Terre Haute, Ind. 473
Washington, D. C. 545

GOVERNMENT AND FINANCE.

Albuquerque, N. M. 362
Altoona, Pa. 388, 496
Appleton, Wis. 568
Atlanta, Ga. 163, 24[illegible]
Astoria, Ore. 615
Atlantic City, N. J. 547
Baltimore, Md. 49[illegible]
Bethlehem, Pa. 63, 206
Bradford, England 432
Bridgeport, Conn. 183
Champaign, Ill. 206
Charleston, W. Va. 362, 40[illegible]
Chicago, Ill. 58[illegible]
Cincinnati, O. 523
Clarksburg, W. Va. 495
Collingswood, N. J. 495
Columbus, Ga. 316
Columbus, O. 183 267, 547
Dallas, Tex. 14
Danville, Va. 267
Davenport, Ia. 615
Dayton, O. 182
Detroit, Mich. 522
Duluth, Minn. 13
East Cleveland, O. 568
East St. Louis, Ill. 495, 522
Elkhart, Ind. 615
Gloucester, Mass. 495
Goldsboro, N. C. 139
Hanford, Cal. 432
Harrisburg, Pa. 338
Haverhill, Mass. 4[illegible]
Huddersfield, England 38
Indianapolis, Ind. 182, 316
Joplin, Mo. 206
Lansing, Mich. 133
Lincoln, Nebr. 567
Los Angeles, Cal. 138
Lynn, Mass. 495
Madison, Wis. 14
Mansfield, O. 615
Methuen, Mass. 49[illegible]
Minot, N. D. 294
Moorehaven, Fla. 138
Newark, N. J. 403
New York, N. Y. 37, 63, 206, 237
Norfolk, Va. 547
Oakland, Cal. 163, 615
Ottumwa, Ia. 267
Petersburg, Va. 183
Philadelphia, Pa. 316, 338
Portland, Ore. 138, 163, 589
Portsmouth, Va. 62, 138
Rome, Ga. 237, 408
Sacramento, Cal. 267
Salt Lake City, Utah 523
Santa Barbera, Cal. 432
Sault Ste. Marie, Mich. 13
So. Charleston, O. 495
Springfield Ill. 163
Springfield, Mass. 53
St. Louis, Mo. 162
St. Petersburg, Fla. 495
Tallahassee, Fla. 338
Tampa, Fla. 294
Toledo, O. 294, 338, 362
Trenton, N. J. 14, 338, 496, 589
Tucson, Ariz. 523
Waltham, Mass. 495
Washington, D. C. 13, 317
Watertown, N. Y. 62
Wheeling, W. Va. 13
Winchester, Mass. 496
Xenia, O. 267

STREET CLEANING AND REFUSE DISPOSAL.

Akron, O. 184
Albany, N. Y. 317
Anniston, Ala. 523
Asheville, N. C. 637
Bridgeport, Conn. 184
Canton, O. 184, 523
Columbus, O. 183, 523
Council Bluffs, Ia. 338
Edinburgh, Scotland 317
Flint, Mich. 207, 317
Indianapolis, Ind. 183
Lansing, Mich. 206, 237
Minneapolis, Minn. 524
New York, N. Y. 184, 207, 237, 637
Pocatello, Idaho 207
San Jose, Cal. 537
Sioux City, Ia. 339
Spokane, Wash. 184
Washington, D. C. 338, 637

TRAFFIC TRANSPORTATION.

Akron, O. 569
Albany, N. Y. 38, 64, 139, 615
Atlanta, Ga. 45[illegible]
Austin, Tex. 140, 590
Boston, Mass. 63, 185, 569
Bridgeton, N. J. 589
Bristol, Va. 409
Butte, Mont. 207
Chicago, Ill. 15, 638
Cincinnati, O. 295
Cleveland, O. 15. 295, 363, 569, 589
Dallas, Tex. 409
Duluth, Minn. 15
Hartford, Conn. 339
Indianapolis, Ind. 63, 339
Jefferson City, Mo. 590
Kansas City, Mo. 207
Leeds, England 16
Lima, O. 208
Liverpool, England 185
Madison, Wis. 569
Madrid, Spain 140
Milwaukee, Wis. 590
Minneapolis, Minn. 409, 590, 616
Monroe, La. 267, 339
New York, N. Y. 39, 139, 185, 208, 267, 268, 568
Niagara Falls, N. Y. 64
Sacramento, Cal. 638
San Francisco, Cal. 267, 339, 409, 616
San Jose, Cal. 38
Seattle, Wash. 140, 362, 638
Tacoma, Wash. 140, 432
Toledo, O. 408
Trenton, N. J. 14, 185, 433, 568
Washington, D. C. 408, 590

MISCELLANEOUS.

Akron, O. 410
Albany, N. Y. 64, 410
Ashtabula, O. 548
Baltimore, Md. 39, 340, 496, 524
Bayonne, N. J. 141
Bluefield, W. Va. 411
Boston, Mass. 84, 85
Bridgeport, Conn. 208
Bucyrus, O. 411
Cleveland, O. 410
Columbus, O. 410, 548
Dallas, Tex. 411
Davenport, Ia. 65
Dayton, O. 116, 410
Denver, Col. 341
Evansville, Ind. 228, 341
Ft. Smith, Ark. 340
Ft. Worth, Tex. 474
Harrisburg, Pa. 164
Hartford, Conn. 164
Indianapolis, Ind. 433
Lansing, Mich. 341
Lincoln, Neb. 639
Los Angeles, Cal. 185
Louisville, Ky. 524
McAlester, Okla. 116
Mobile, Ala. 295
New York, N. Y. 116, 238, 268, 433, 547, 639
Norfolk, Va. 140
Omaha, Neb. 411
Palo Alto, Cal. 141
Philadelphia, Pa. 496
Portland, Ore. 39, 185, 411
Quebec, Canada 340
Sacramento, Cal. 295
Salt Lake City, Utah 524
San Diego, Cal. 411
San Francisco, Cal. 525
Shelby, O. 411

Sherman, Tex. 433
Spokane, Wash. 86, 340
Springfield, Mass. 16
St. Louis, Mo. 341
St. Paul, Minn. 186
Syracuse, N. Y. 548
Trenton, N. J. 86, 474
Wadsworth, O. 268
Washington, D. C. 16, 85, 164, 340, 341, 411, 474, 524
Williston, N. D. 205
Willoughby, O. 525
Yonkers, N. Y. 87

Legal News

Adverse Possession — Street Ownership 570
Advertising, Municipal—Lowest Bidder 474
Agent, Unauthorized — Liability of Municipality 239
Alley, Establishing—Prescription 239
Alley, Right to Open—Compensation for Closing 87
Appropriation, Bid Higher Than—Procedure 238
Assessing Cemetery for Sewers 570
Assessing Cost for Sewage Disposal Plant 570
Assessing Costs—Benefits 570
Assessment, Sidewalks—Construction and 186
Assessment, Unjust 186
Assessment—Wrong Basis 570
Assessments and Benefits, Bases for ..570
Assessments, Block System 87
Assessments—Change of Grade 87
Assessments—Constructing Sewer 239
Assessments—Exempting Property — Authority 570
Assessments—Reasonability 239
Auditorium, Leasing Public 295

Benefits—Assessing Costs 570
, Bases for Assessments and 570
Bid Higher Than Appropriation—Procedure 238
Bidder, Letting to Lowest—When Inapplicable 87
, Lowest—One Bidder 87
, Lowest — Public Improvement Contract 525
Bids for Street Work—Accuracy of Estimate 238
Bill, Certification of Bill, Lack of Funds 87
Billboards, Size and Position of—Police Power 87
Bond for Jitney Operator—Liability of Surety 268
Issuing Power of Municipalities for Filter Plants 363
—Liability, Surety on 186
Bonds, Authorization of—Amounts of Issues 87
for Filter Plant—Vote 239
, Maintenance 363
, Sinking Fund—Limitations on Tax Levies 268
Building, Municipal—Limit of Cost ..268
Buildings in Conflict with Ordinance, Erecting 474
Within Fire Limits, Limiting 474
Cemetery for Sewers, Assessing 570
Commissioner, Power of Fire—Installing Fire Sprinkler 474
Concrete—"Stone" Walks 239
Contract, Definiteness of—Repairing Streets 238
—Estimates, Sewer 186
—Maintaining Street 239
Money for Guaranty, Retaining Part of 570
Money to Creditors, Proportioning 570
, Public Improvement — Lowest Bidder 525
Work Under Burdensome Conditions—Extra Pay 363
Contracting for Sewer Construction, Estimating and 525
, Powers of Cities 87
Contractor, Subway — Liability for Light and Air 570
to Recover, Ability of—Insufficient Petition 87
Contractor's Agreement, Breach of ..186
Employe — Injury — Liability of City 268
Contracts, Payment of — Indebtedness 87
Cost, Limit of—Municipal Building 268
Council to Supervise Streets, Right of 570
Creditors, Proportioning Contract Money to 570
Damages, Payment for—Power to Discontinue Streets 239
Debt Limiting Municipal Indebtedness 87
Discontinue Streets, Power to—Payment for Damages 239
Streets, Power to—Source 239
Ditch Dug by City—Liability of City 363
Diversion — Right to Percolating Waters 268
Drainage System—Best Design—Decision 238
Drains—Contamination of Pond 295
Election—Validity, Initiative 239
Emoluments, Abolition of Office 239
Estimate, Accuracy of—Bids for Street Work 238
Estimating and Contracting for Sewer Construction 525
Extra Work, Compensating for 239
Pay—Contract Work Under Burdensome Conditions 363
Work on Sewer, Recovery 87
Filter Plants, Bond Issuing Power of Municipalities for 363
Fire Engine, Testing, Liability for Damages 474
Engines—Restricting Specifications 238
Limits Law, Violating—Penalty 474
Limits, Limiting Building Within 474
Sprinkler, Installing—Power of Fire Commissioner 474
Fireman, Dismissed—Right to Pension 474
Firemen and Policemen, Free Rides for—Regulative Jitneys 268
Foundation, Injury to—Basis for Suit 570
Funds, Right of Taxpayers to Recover 570
Garages, Regulations of — Storing Volatile Oil 239
Garbage Collection — Governmental Duty 87
Dump—Nuisance—Liability 87
Gas and Electric Rate by Contract—Power to Change 496
Grade, Change in—Liability 87
, Change of—Assessments 87
Guaranty, Retaining Part of Contract Money for 570
Health Ordinances—Police Power ...363
, Power of City Board of 239
Initiative—Election—Validity 239
Jitney Operator, Bond for—Liability of Surety 268
Jitneys on Certain Streets, Prohibiting—Police Power 570
, Regulating—Free Rides for Policemen and Firemen 268
Leasing Public Building—Injunction 239
Letting to Lowest Bidder—When Inapplicable 87
Liability—Accident on Icy Sidewalk ..570
for Damages—Testing Fire Engine 474
for Defects—Accepting Part of Street 238
for Injuries—Sidewalk Vault 570
for Light and Air—Subway Contractor 570
for Offensive Operation of Sewage Disposal Plant 87
of City—Contractor's Employee—Injury 268
of City—Ditch Dug by City 363
of Municipality — Unauthorized Agent 239
of Municipality—Water Supply ... 87
—Payments Without Warrants ..525
, Protection of Municipality from 87
Loitering—Police Power 570
Maintaining Street—Contract 239
Streets—Obligation 239
Maintenance Bonds 363
—When Necessary 239
Nuisance—Encroaching in Street 525
—Liability—Garbage Dump 87
Notice of Special Meeting, Waiving ..525
Notices, Error in—Republications 525
Obstructing Sidewalk—Necessity 268
Obstruction in Street—When Actionable 363
Office, Abolition of—Emoluments 239
, Disqualifications for 239
, Removal from—Vacancy 239
Officials, Statements by City—Building City 496
Ordinance, Enforcing Observance of ..525
, Formality in Passing 496
, Recording—Validity 525
—Resolution—Distinction 238
, Reasonability of—Police Power 239
, Reasonableness of 363
, Valid and Invalid Parts of 496
Ordinances, Revising City—Extra Pay for City Attorney 496
Pay for City Attorney, Extra—Revising City Ordinances 496
Payment by Taxes—Purchase of Engine 239
Payments Without Warrants—Liability 525
Pedestrians, Relative Rights of Vehicles and 295
Pension, Right to—Dismissed Fireman 474
Police Power, Constitutionality, Private Rights 87
Power—Definition 363
Power—Health Ordinances 363
Power—Lateral Support 295
Power—Loitering 570
Power—Prohibiting Jitneys on Certain Streets 570
Power — Prohibiting Sidewalk Vaults 570
Power—Reasonability of Ordinance 239
Power—Sale of Deadly Weapons 295
Power—Size and Position of Billboards 87
Policemen and Firemen, Free Rides for—Regulating Jitneys 268
Powers, Transfer of—Continuation of Regulations 268
Property, Access to—Interference 525
Rate by Contract—Gas and Electric—Power to Change 496
Resignation of Employee—Civil Service 474
Resolution—Distinction—Ordinance 238
Roadbed Illegally, Raising—Remedy ..570
Salary—Fixing, Recovery 268
Recovery, Counter Claim for—Money Improperly Paid 496
Sewage Disposal Plant, Assessing Cost for 570
Disposal Plant, Liability for Offensive Operation of 87
Sewer, Constructing—Assessments ..239
Construction, Damage to Gas Mains by 570
System—Description 87, 239
System—Failure to Construct 363
Sewers, Right to Construct Local 525
Sidewalk for Loading and Unloading, Right to Use 239
Vault—Liability for Injuries 570
Vaults, Prohibiting — Police Power 570
Specifications, Restricting—Fire Engines 238
Storing Volatile Oil—Regulations of Garages 239
Street, Accepting Part of—Liability for Defects 238
, Encroaching in—Nuisance 525
, Fee in—Owner of Lot 186
, Obstruction in—When Actionable 363
Ownership—Adverse Possession ..570
Privileges to Corporations 570
Streets, Duty to Keep Open 87
, Extending—Necessity 496
, Right of Council to Supervise ..570
, Right to Prohibit Use of 570
Subway Construction not Governmental Function 570
Tax Levies, Limitations on—Sinking Fund Bonds 268
Taxes, Payment by—Purchase of Engine 239
Taxpayers to Recover Funds, Right of 570
Vehicles and Pedestrians, Relative Rights of 295
Walk, Accident on Icy—Liability 570
Water Supply—Liability of Municipality 87
Waters, Right to Percolating—Diversion 268
Waterworks not Governmental Function, Maintaining 363
Weapons, Sale of Deadly—Police Power 295

Authors

Abbott, Carl P.,
"Laying Iron Pipe Sewer in White Plains" 479
Abbott, H. R.,
"Sewer Construction in Chicago" .350
Adamson, Robt., Fire Commissioner of New York,
"The New York Bureau of Fire Prevention" 443, 482
Allen, H. C.,
"Machine Trenching for Water Pipes" 94
Bell, Chas. M.,
"Baby Carriages and Street Crossings" 304
Bostwick, Andrew Linn,
"Permanent Assessment Boards" .200
Brewer, Bertram,
"Rate Revision in Municipal Works" 285
Brown, Charles Carroll,
"Maintenance and Repair of Improved Roads" 485
"Maintenance of Concrete Pavement" 248
"Street Planning and Construction in Bexley" 323
Champion, R. B.,
"Cleaning Sewers in Holland, Mich" 194
Fleming, T. Alfred,
"Fire Marshal Department of Ohio" 439
Furse, James,
"Municipal Water Department Finances" 222

Geiger, C .W.,
"Low Electric Rates in Los Angeles" 511
"Power and Water Bureau Shops in Los Angeles.....131
"Recovering Irrigation Water"..375
"Road Maintenance in Los Angeles" 277
Gordon, F. G.,
"Lansing Concrete Reservoirs".220
Hardenbergh, W.,
"Machinery on a New York Highway" 99
Hardenburg, W. E.,
"Laying Steel Water Main in St. Louis" 317
"Sewer Work in Rock and Quicksand" 123
"The Chouteau Avenue Viaduct".417
Hicks, H. L.,
"Compressed Air in Street Excavating and Tamping.....108
Hiller, J. A.,
"High Pressure Fire System of Cincinnati" 597, 630
Hoopes, Edgar M., Jr.,
"Recent Improvements in Wilmington's Water Supply".....213
Kuelling, H. J.:
"Sand Road Experiments in Wisconsin" 396
Main, George A.,
"Sewerage System of Daytona" 191
Nelthorpe, Henry F.,
"Motor Vehicles in Spokane City Work" 106
Perkins, A. C.,
"Constructing the Storm King Road" 169
Reilly, Albert R.
"Work on Calumet Intercepting Sewer" 176
Stein, Milton F.,
"Saving Coal in the Water Works Pumping Station"..... 49
Steward, Selden L.,
"Building Roads in the Everglades 531

Municipal Appliances

Cab, All-Year.....118
Car Loader, Automatic.....275
Castings, Steel..... 89
Chemical Engine for Army Service.551
Chipping Hammer and Air Drill....321
Concrete Mixer, Olsen.....242
Culvert Form, Collapsible.....573
Drill, Chipping Hammer and Air....321
Engine for Army Service, Chemical.551
Engines and Pumping Units, Portable Oil 369
Excavating and Tamping, Compressed Air in Street..... 108
Explosives for Loosening Soil.....101
Fire Alarm, Sterling.....243
Truck, Emergency..... 46
Firing Door.....344
Form, Collapsible Culvert.....573
Forms, Adjustable Cores and..... 68
Gasoline Measuring Pumps.....551
Grader, Turbine Traction.....618
Joint, Flexform.....619
Loader, Automatic Car.....275
."Rapid" Car.....298
Manhole Cover..... 211
Cover, Pivot- Lock..... 89
Meter Box Top.....166
Connections 436
,Recording-Demand Watt-Hour.. 46
Mixers, Ideal Cincinnatus.....572
Paving Roller, Macon Concrete.....393
Pipe Pusher, Easy.....274
Pumping Units, Portable Oil Engines and 369
Pumps, Gasoline Measuring.....551
Railways, Industrial.....105
Road Machine, Combination.....119
Roller, Macon Concrete Paving.....393
,Port Huron Road.....436
Scarifier, Road.....415
Sewer Basin, "Odorless".....188
Spreader, Stone..... 68
Tapping Machines.....293
Tractor, G. M. C. Samson.....344
,Lenox "American".....146
-Trailer Dump Truck.....120
Truck, Duplex Hook and Ladder....476
,Emergency Fire..... 46
,Sanford 369
,Steamoter 210
,Tractor 166
,Tractor-Trailer Dump.....120
With Winch.....476
Trucks, Electromobile.....414
,Winther Motor.....188
Tunnel Plates.....146
Turbine Traction Grader.....618
Vehicles, Walker Electric..... 320
Wheel, Smith.....392
Winches, Truck.....118

Municipal Journal

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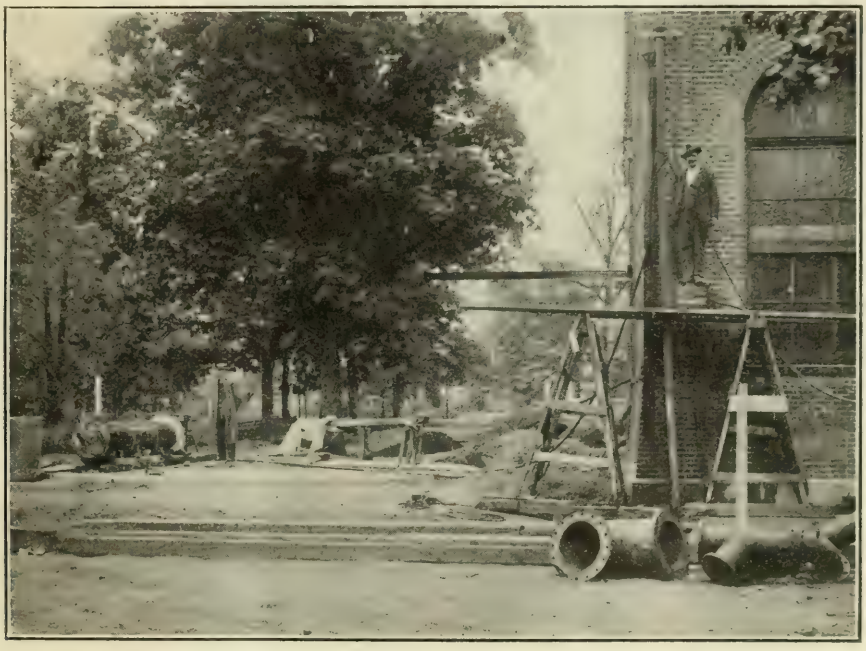
EXPERIENCE WITH A VITRIFIED WATER CONDUIT

Making Water-Tight Joints in a Line of Eighteen-Inch Vitrified Pipe—Bituminous Compounds Used—Difficulties Due to Use of Cement—Methods of Making Tests and of Repairing Leaking Joints.

For several years past the Bureau of Sewers of Brooklyn, N. Y., has used successfully for making water-tight joints in vitrified pipe a joint compound composed of an bituminous mixture. In 1912 the Bureau of Water Supply of New York was considering the use of vitrified pipe for constructing certain conduits, and tested 12-inch vitrified sewer pipe with joints made with "G. K. compound" and "Jointite," both bituminous compounds. This test showed that such a joint would stand 29 pounds pressure per square inch. At the same time the bureau tested joints made of plain yarn, those of yarn soaked in cement grout, and joints of lead wool, all of which gave very unsatisfactory results. At an earlier date poured cement joints also had been found to leak freely. The laboratory examined the mixture known as "Filtite A," which had been used by the Sewer Department, and reported it to be "a compound of asphaltic base with petroleum residue, containing about 50 per cent. of mineral matter. It is apparently unaffected after 48 hours' immersion in fresh and salt water and in weak acid and alkaline solutions. Previous experiments upon similar materials indicate that it will not be materially affected. At 205 degrees F. it is a viscous liquid flowing somewhat slowly like cylinder oil. After two hours' exposure to a temperature of 220 degrees F. it loses only 0.11 per cent. in weight."

On the basis of this report and the test previously made, the bureau in 1914 decided to use vitrified pipe for a certain portion of the work on Staten Island. This island was supplied by a driven well system, the supply being derived from five groups of wells from which the the water was drawn by means of electrically driven centrifugal pumps and delivered into collecting lines through which it flowed to a pump well at a central pumping station. It was for carrying the water from the wells to the pumping station that there was used 7,460 feet of 18-inch vitrified pipe and 557 feet of 24-inch vitrified pipe. Vitrified pipe was used in preference to cast iron chiefly because the substitution of 18-inch vitrified pipe for 16-inch cast iron reduced the estimated cost from $27,000 to $20,000, and it was expected that not more than two years would elapse before this service would be abandoned and the supply obtained from the Catskill Mountains. There was no fear of the pipe itself being of insufficient strength, since it was estimated that the maximum pressure under working conditions would be about 5 pounds per square inch.



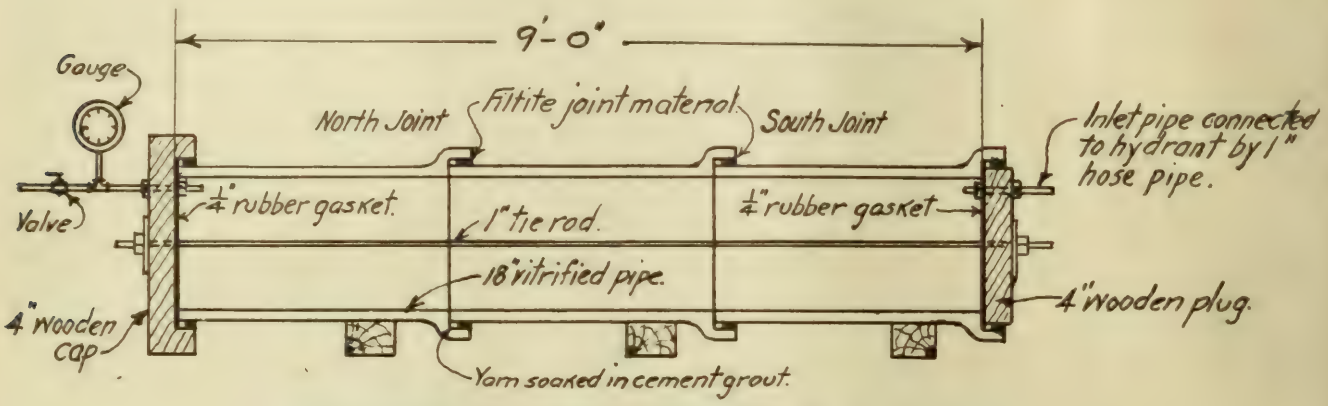
MAKING TEST OF JOINTS IN 18-INCH VITRIFIED PIPE.
Hydrostatic pressure produced by column of water with 12-foot head.

It was specified that the inside of the hub and outside of the spigot of the vitrified pipe were to be corrugated and that a special method of making the joints, as described in the next paragraph, should be employed. The pipe was laid to grade on the bottom of the trench.

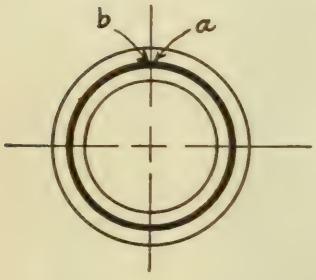
The bid accepted for furnishing, delivering and laying the 18-inch vitrified pipe was 90c per lineal foot, and that for laying the 24-inch pipe $1.25 per lineal foot; while the bid for earth excavation and backfilling was 50c per cubic yard.

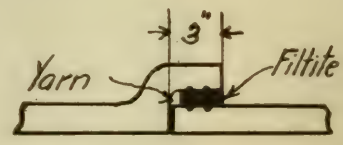
The method of making the joints was not that usually followed in using this material for sewer work, but it was provided that "a gasket of packing yarn, dipped and saturated in cement grout, which shall have been mixed not more than 30 minutes previously, shall be firmly rammed into the joint with a hard wood calking tool. Such gaskets shall be in one continuous piece of a length sufficient to reach entirely around the pipe and give a lap, and of sufficient thickness that when rammed in place the connected pipes shall be firmly held to their proper concentric position. If necessary, one or more additional gaskets of the same kind shall be driven into the hub so as to fill it to a total depth such that a depth of about 2 inches will remain for the joint material." This joint material was specified to be such as would run freely at not higher than 250 degrees F., should adhere well to the glazed surface of earthenware pipes, should be elastic enough at ordinary temperatures to permit slight movement but not become soft enough to run out of the joints.

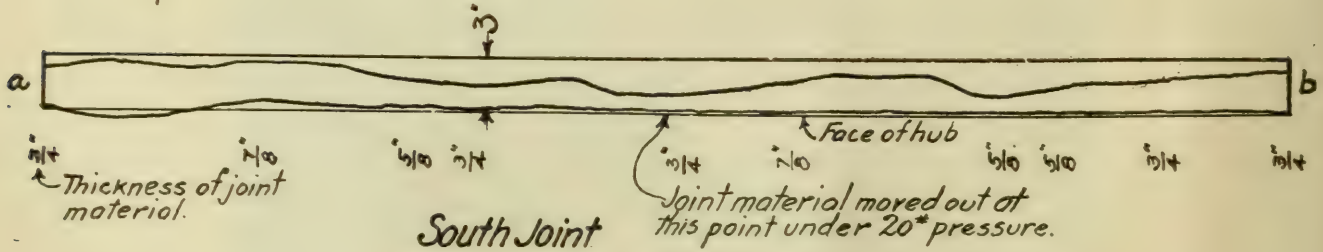
It was specified that the hubs and spigots should be thoroughly cleaned before the joint was poured. The engineer in charge of field work has stated that the space left for the joint material was cleaned as thoroughly as possible of the grout which was smeared on the inside of the hub and on the spigot in the process of calking the grout-soaked yarn. Later examinations and tests seemed to indicate, however, that this cleaning was not thorough and it is possible that it would be impracticable in actual work to secure total removal of all such smear of cement from the pipe surface.



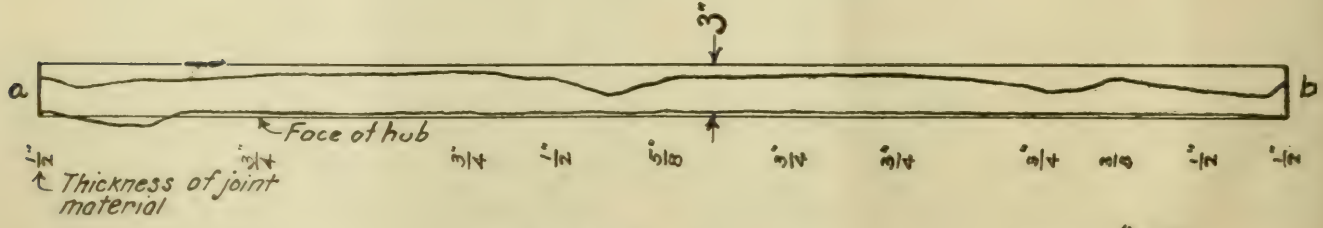
ARRANGEMENT OF PIPES FOR TESTING
SCALE 1"-2'







South Joint



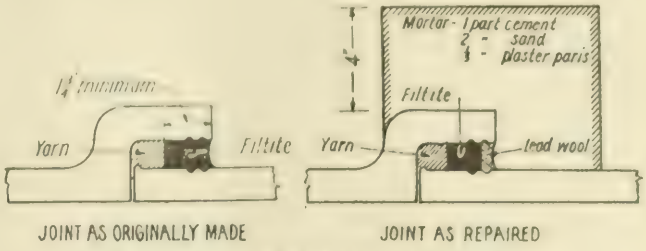
North Joint

Scale 1"=10"

METHOD OF MAKING JOINTS AND DEVELOPMENT OF SAME.

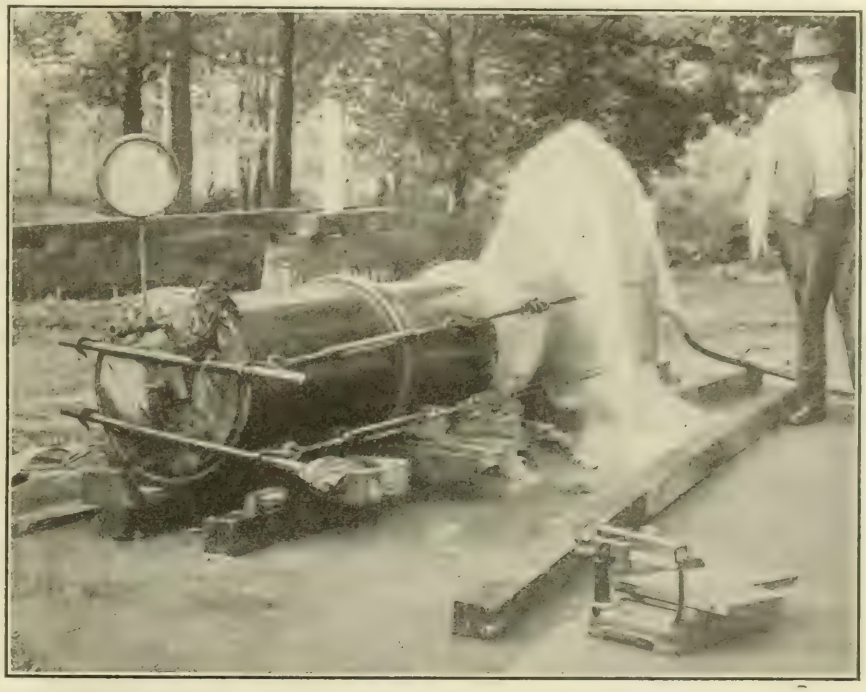
After the construction of the pipe line had been completed, it was noticed that ground water was entering the pipe, averaging 43,470 gallons per day during a 3-day test, which was equivalent to 163 gallons per joint per 24 hours. A few weeks later the pipe line was tested, the head being about the working head and at 22 points in a distance of 1,261 feet water showed on the surface. An examination of the line was then made and leaky joints were found to be due to three causes; first, a separation between the joint compound and the barrel of the pipe or between the joint compound and the hub. This separation varied from the merest hair line opening to an amount which would admit the passage of a knife blade. Second, joints in which the compound had started to blow out, in general more at the bottom of the pipe than at the top, varying from the merest indication of starting to cases where pieces of the compound were ready to fall out. Third, joints where the material at the bottom had entirely blown out. Both the contractor and the city, were, of course, interested to learn the cause of this failure, when such good results had been expected and had been experienced in other work. In cutting out defective joints it was found that in many cases cement was adhering to the compound, showing that, in spite of careful washing and cleaning of the joint space after the cement-soaked yarn had been calked home, some cement had adhered to the hub and spigot of the pipe. The gray coloring of the cement could still be noticed on the pipe in the joint space, even after the joint compound had been cut out. The manufacturers and also the contractors stated that use of the cement-soaked yarn was not customary and had not been used on sewer work on which the same contractor had used similar compounds. The engineer in charge of the work stated it as his opinion, "after careful personal observation while making repairs to this line and the behavior of test joints made and referred to in my report of April 19, 1915, on these repairs, as well as the apparent fact that this cement grout-soaked yarn has not been used on similar joints for this class of work, that a thin film of Portland cement grout adheres to the sides of the joint space, no matter how carefully cleaned, and does prevent any adherence of a joint compound having an asphaltic base; and I would recommend in the case of such leaks as do appear that such joints be cut out, thoroughly cleaned, recalked with clean, dry yarn and the joint re-run with joint compound. While I do not believe that a vitrified line can ever be made as tight as a cast iron main laid in the usual manner, I do believe that this line can in this way be made reasonably tight and serviceable for the period of time it is expected that it would be required."

This line was continued in service until February, 1917, when it was shut down and use of the Catskill supply was begun in Richmond borough (Staten Island). Up to this time a few leaks had been found and stopped every month. In stopping these leaks, the contractor removed the joint material and re-ran the joint. After the expiration of the 12 months maintenance period provided for by his contract, the department tried various schemes, the one mainly used by it being to drive the joint material into the hub, calk in lead wool, and then place a concrete block around the joint, as shown in the illustration. It was found that in driving the joint material into the hub the bond between such material and the pipe was broken and it is probable that after this such material was of little service in preventing leakage.



METHOD OF REPAIRING JOINT.

After these leaks had been discovered, tests were made, one at Grant City and one at the Portland avenue yard in Brooklyn. The illustrations shown herewith are from photographs of the Grant City test. In this test three lengths of 18-inch vitrified pipe were set on a timber grill and supported in line and grade by wooden wedges. Each end of the line was closed with a wooden bulkhead, the two bulkheads being tied together by an iron rod as shown in the illustration. The two joints between the pipe were calked with grout-soaked yarn, after which the joint space was thoroughly cleaned and dried. It would appear from the results that in this case the cleaning was performed more thoroughly than it seemed practicable to obtain in the actual work. After the pipes had dried, the joints were run with the compound and three days later were filled with water and subjected to pressure. At 11:05 A. M. the pipes were full and the air valve was closed, and a head of 4 feet was applied. At 12:40 the head was increased to 8 feet and at intervals of a few minutes the head was increased one foot at a time until at 2:55 it had been increased to 12 feet. Owing to rain the test was then stopped and the pipe emptied. Four days later the pipe was again filled and subjected to a 12-foot head and this head maintained for 24 hours before showing any leak-



PIPE BURSTING AT PRESSURE OF 40 POUNDS.

age. The test was kept on with slight leakage until June 14th, when the pressure was slowly raised to 35 pounds, at which there was a leakage from one joint of 232 gallons per 24 hours. The pressure was then raised to 40 pounds, when the pipe split, as shown in one of the photographs.

The lesson to be learned from this experience apparently is that care must be taken that foreign material, including Portland cement, be entirely removed from vitrified pipe when using asphaltic joint compounds; but that if this is done a joint can be obtained that is tight under at least a 10-ft. or 15-ft. head. It also seems probable that the practice, in making such joints, of soaking the yarn in cement grout before calking it into place is seriously objectionable and possesses little advantage to offset the objectionable features.

For the above facts and for the illustrations used we are indebted to William W. Brush, deputy chief engineer of the Bureau of Water Supply, who embodied them in a paper delivered before the American Water Works Association.

UNDERGROUND SURVEY IN PHILADELPHIA.

During the year 1916 the Bureau of Highways of Philadelphia had three field corps and a checking corps employed in surveying the surface and underground structures of 232 miles of highways. The data obtained by the field work were plotted and recorded in pencil on 8x10-inch cards, which cards served both as field book and as final record. These cards are being completed in the office in finished form as rapidly as possible, and in the meantime the information on them is in such shape as to be readily accessible for guidance in assignment of location for proposed new structures.

The work of revising and bringing up-to-date the plans already on file was kept up throughout the year. At the present time there are on file in the department records of structures in 1,017 miles of streets, records of 473 miles being on 25x29-inch plans, those of 522 miles being on the 8x10-inch cards in pencil only, and those of 22.5 miles on 4x10-inch cards fully completed. At the end of the year approximately 390 miles of streets remained to be surveyed and it was hoped to complete that work within the year 1917, after which only a sufficient number of men will be retained to survey new streets and record changes in existing structures.

These records are of the most vital importance to the city and their replacement would require years of time and the expenditure of thousands of dollars in case they should be destroyed by fire. In order to provide duplicates to insure against any possibility of the information being entirely lost, a photostat machine was installed in 1916, which, by a photographic process, makes a full-size print to exact scale direct from the 25x29-inch plans and at a cost very much less than that which would be required to make tracings of the plans. By the end of the year about one-sixth of the plans had been so reproduced and the duplicates placed in a fire-proof vault.

WATERWORKS STATISTICS.

In our issue of May 3rd we published statistics of more than eight hundred cities, covering details of waterworks installations and practice as furnished for this purpose by the superintendents of the several cities. A few replies to our inquiries were received too late for that issue, and these we are presenting this week in the following tables. These forty-five cities complete the list of those from whom we have received this information.

TABLE NO. 1—GENERAL WATER WORKS STATISTICS.

City	Population	No. supplied with water	Average consumption	Per cent metered	Source of supply	Per cent of total supply pumped	Head pumped against	Pumped to	Kind of power used	Kind of pump	Purification process
Arkansas:											
Hope	6,000	.....	400,000	82	Wells	All	150 ft.	Reservoir & 100 ft. to tank	Steam piston	Air lift, hor. recip.	None
California:											
Los Angeles	550,000	525,000	55,000,000	..	River & imp. res.	....	25-275 ft.	Reservoir	Steam & elec.	.....	Infiltration galleries
Colorado:											
Lamar	4,000	4,000	296,600	..	Underground flow of dry stream	None	.....	.....	.....	.....	None
Connecticut:											
Ansonia	12,000	11,000	1,800,000	80	Stream	None	.....	.....	.....	.....	None
Illinois:											
Chester	3,000	130	30,000	..	River	All	180 lbs.	Standpipe	Steam	Recip. duplex, high duty	None
Lewistown	3,000	2,000	.....	..	Large well	All	300 ft.	Standpipe	Steam piston	Hor.	None
Lincoln	11,000	1,725	903,319	..	Wells & infilt. gallery	All	100 ft.	Standpipe	Steam piston & electric	Duplex power, duplex tandem comp., direct	None
Iowa:											
Marshalltown	17,000	13,000	1,800,000	70	Driven wells in gravel	All	170 ft.	Standpipe	Steam piston	Hor. direct	None
Kansas:											
Dodge City	5,500	4,800	350,000	50	140 ft. wells	All	135 ft.	Standpipe	Steam piston	Recip. hor.	.....
Kentucky:											
Morganfield	3,500	1,000	160,000	20	Wells	All	100 lbs.	Reservoir	Steam piston	Reciprocating	None
Maine:											
Farmington	2,100	1,800	.....	..	Lake	None	85 lbs.	Standpipe	.....	.....	None

TABLE NO 1—GENERAL WATER WORKS STATISTICS (Continued).

Maryland:											
Baltimore	625,800	650,000	85,000,000	25-30	Imp. reservoir	†	†	†	Steam piston & electric	Recip. vert. & hor., centrif	Rapid filtration & chlorine
Massachusetts:											
Dalton	3,800	.....	800,000	None	Reservoir	None	....	.....	.....	.....	None
Danvers	11,000	11,000	1,250,000	..	Lake	All	80 lbs.	Reservoir	Steam	Horizontal	None
Falmouth	3,500	.....	356,306	Small	Lake	All	80 lbs.	Standpipe	Steam piston	Davidson	None
Woburn	16,410	16,300	2,235,362	50.9	Filt. Gallery & well	All	220 ft.	Reservoir	Steam	Vert. & hor.	None
Michigan:											
Detroit	734,562	781,133	127,565,434	53	River	All	48-66 lbs.	Direct	Steam piston	comp. beam, vert. triple recip.	Liquid chlorine
Minnesota:											
Ely	5,000	.....	500,000	..	Lake	All	100 ft.	Standpipe	Steam piston	Comp. crank & fly wheel, cross comp. duplex	Filtration
Mankato	.....	8,680	800,000	100	Artesian wells	All	225 ft.	Reservoirs	Electric, steam piston	Centr. & recip.	.....
Minneapolis	370,000	350,000	29,500,000	98	River	All	242 ft.	Reservoir	Elec. & steam	Centr. & triple expansion	Rapid filt'n
Moorhead	5,000	.....	220,000	..	Wells	All	50 lbs.	Standpipe	Electric	Downie deep well	None
Nebraska:											
Aurora	3,000	750	.....	..	Wells	All	105 ft.	Standpipe	Elec. & steam	.....	None
Fairbury	6,500	1,000	300,000	100	Spring	All	179 ft.	Standpipe	Steam piston	Reciprocating	None
New Hampshire:											
Lancaster	3,500	2,500	.....	..	Mountain brook	None	.....	.....	.....	.....	None
Pembroke	3,000	3,200	.....	None	Pond	None	.....	.....	.....	...	None
New York:											
Canastota	4,000	3,000	250,000	100	Springs	None	.....	.....	.....	.....	None
Oneida	8,500	.....	.....	98	Springs	200 ft.	.....	.....	.....	.....	None
Rochester	250,000	250,000	23,000,000	70	Lakes	None	.....	.....	.....	.....	None
Watervliet	17,000	16,000	2,000,000	..	Imp. reservoir	All	82 ft.	Reservoir	Hydraulic	Centrifugal	Rapid filter & chlorine
Ohio:											
Montpelier	3,600	.....	500,000	50	Wells	All	45 lbs.	Standpipe	Steam piston	Air lift, duplex comp. direct	None
Oberlin	5,960	5,600	286,000	..	River	All	85 ft.	Standpipe	Steam piston	.....	Rapid filter
Warren	.....	.....	1,500,000	90	River	All	138 ft.	Standpipe	Steam piston, hydraulic	Hor. & vert. recip.	Rapid filter
Oklahoma:											
Miami	6,000	.....	300,000	All	Wells	All	60 lbs.	Tank	Steam piston	Air lift	None
Oregon:											
McMinnville	5,000	4,000	700,000	25	Mountain stream	50	70 lbs.	Direct	Electric	Power plunger	Rapid filter
Pennsylvania:											
Harrisburg	80,000	.....	8,326,733	83	River	All	235 ft.	Reservoir	Steam piston	Vert. trip. & hor. comp.	Rapid filter
West Newton	3,000	2,200	150,000	55	Wells & springs	95	135 lbs.	Reservoir	Electric & int. comb.	Air lift, Vert. triplex	None
Texas											
Orange	12,000	6,000	800,000	81	Artesian wells	All	40 lbs.	Standpipe	Steam piston	Vertical	.....
Sulphur Springs	8,500	3,000	.....	65	.....	.....	150 ft.	Standpipe	Steam piston	.....	Precipitation
Terrell	8,000	4,700	130,000	100	Wells	All	60 lbs.	Reservoir	Steam	Direct acting	None
Waco	45,000	.....	3,800,000	50	Artesian wells	All	85 lbs.	Standpipe	Steam piston	Crank & fly whl.	Filtration
Virginia:											
Winchester	6,445	7,000	1,000,000	20	Spring	All	250 ft.	Reservoir	Steam piston, electric	Recip. centr.	Chlorine
Washington:											
Spokane	130,000	113,100	19,525,744	73	Wells	All	370 & 200 ft.	Reservoirs	Hydraulic, electric	Centr., recip.	None
Wisconsin											
Monroe	5,000	3,500	190,000	88	Artesian wells	All	190 ft.	Standpipe	Steam piston	Air lift, triplex, comp.	None
Wyoming:										.....	None
Laramie	8,000	8,000	4,000,000	None	Springs	None	.....	.....	.....		

*Part of supply only. †All pumped 15 ft. to filter. Then 67% by gravity, rest pumped against 110 lb. to reservoir, and 2% repumped against 145 lb. to standpipe and 1% against 100 lb. to standpipe.

BITUMINOUS SURFACE TREATMENT IN PHILADELPHIA.

The practice of surface treating waterbound macadam roads with bituminous materials was begun by the Bureau of Highways of Philadelphia in 1912. At that time only a few roads were in a sufficiently good condition to warrant this treatment, but during the past three years the roads of the city have been placed in such excellent condition that bituminous surface treatments have been applied to practically the entire yardage of macadam roads throughout the city.

In the case of dirt roads and the few macadam roads that are not in first class condition, these are given a treatment of dust-laying oil, which, while it has but slight influence on the durability of the road, gives material service as a dust layer. The cost of treatment has continually decreased from an average of 7.3 cents in 1913 to 5.03 cents in 1915, the decrease being due both to decreasing amounts of material required and increased efficiency of the working force and more effective planning for the work. The cost in 1916 rose to 5.34 cents, largely because of the increase in cost of materials and

TABLE NO. 2.—DISTRIBUTION SYSTEM.

City	Ownership	Conduit to city: Length miles or feet	Conduit to city: Size inches	Conduit to city: Material	Length of street mains in service—cast iron unless otherwise indicated. w. i. = wro't iron; wd. = wood; stl. = steel. 3" & under	4"	6"	8"	10"	12"	14" or larger
Arkansas:											
Hope	M	1	.....	.....	17 c.i.	.....	21,250	5,900	2,500	.....	.....
				.....	25,000 w. i.	.....					
California:											
Los Angeles	M	275	Various	stl & con	.....	2,521,996	1,170,331	271,487	.....	.....	.....
								47,931 w.i.	.....	.....	.....
Colorado:											
Lamar	M	3	10	stl., tile &	.....	13	½	1½	½	2	.....
		9.5	12	wd. st've	.....	.....	.....	.....	.....	.....	.....
Connecticut:											
Ansonia	P	2	10 & 24	c. i.	3,000	26,250	20,500	15,500	4,450	3,500	4,000
Illinois:											
Chester	P	.....	.....	.....	1,400 w. i.	10,690	2,500	5,000	.....	.....	.....
Lewistown	M	15,300	8	c. i.	3,225	22,525	1,500	3,000	.....	.....	.....
Lincoln	P	2,200	14	c. i.	25 miles, all sizes, c. i. pipe.				.....	.....	.....
		2,200	24	c. i.	5 miles, wrought iron pipe				.....	.....	.....
Iowa:											
Marshalltown	M	300	24	c. i.	4,295 w. i.	40,627	.....	139,380	24,740	1,588	9,917
Kansas:											
Dodge City	M	.....	.....	.....	.....	40,000	19,000	8,000	2,000	1,000	.....
Kentucky											
Morganfield	M	.....	.....	.....	.....	5	2	1	.....	.....	.....
Maryland:											
Baltimore	M	37,000	144	tunnel	95,278	731,888	1,546,981	53,535	471,637	154,690	443,313
Maine											
Farmington	M	.....	10	c. i.	1,500 w.i.	2,500	1	½	.....	.....	.....
Massachusetts:											
Dalton	M	2	10	c. i.	6,000	35,000	9,000	6,000	6,000	.....	.....
		1	12								
		1	14								
Danvers	M	.....	18	c. i.	33,650 w. i.	28,397	46,437	16,533	.....	41,220	.....
Falmouth	M	.....	.....	.....	.....	80,803 cmt.	12,031 cmt.	9,432 cmt.	.....	13,843 cmt.	.....
		.....	12	.....	.....	.....	.....	.....	.....	.....	.....
Woburn		1½	16	c. i.	52 miles of pipe						
		1	12	cement	54.85 miles wood pipe in use						
Michigan											
Detroit	M	.....	.....	....	53,967	764,033	2,451,762	383,789	249,285	219,747	416,603
Minnesota:											
Ely	M	1,500	10 & 12	.....	.....	4,508	15,102	1,717	3,327	3,327	.....
Minneapolis	M	.....	50 & 54	steel	.....	.....	1,817,508	465,742	16,147	395,996	342,118
Moorhead	M	150	26	.....	.....	26,738	28,842	3,577	2,985	3,425	.....
Nebraska:											
Fairbury	M	1⅛	12	c. i. & wd. stave	2 bl'ks w.i.	10	1	1	.....	.....	.....
New Hampshire:											
Lancaster	M	1	12	c. i.	.....	.....	.....	.....	.....	.....	.....
Pembroke	M	1	16								
		1	14	wd. stave	.....	1½	1	1½	.....	1½	.....
		12	12				2 wood	2 wood	½	1½	.....
New York:											
Canastota	M	3	12	c. i.	2 w.i.	5	4	2	.....	.....	.....
Oneida	M	3	12-16-18	c.i.	19½ miles in all						
Oswego	M	.....	.....	.....	5,300	.....	.....	.....	.....	.....	.....
					179 w.i.	.....	.....	.....	.....	.....	.....
Rochester	M	30	36	c. i.	.....	.....	.....	.....	.....	.....	.....
		30	38	steel	2,154 w.i.	43,404	154,240	113,587	20,315	38,001	36,508
Watervliet	M	¼	16-18-20	c. i.							
		10	20	wd. stave	2,000 w.i.	18,010	57,200	11,100	16,000	7,670	1,535
Ohio:											
Montpelier	M	.....	10	.....	.....	.....	.....	.....	.....	.....	.....
Oberlin	M	6.5	8, 10 & 12	vit. pipe	.....	4.22	7.2	1.25	.....	.....	.....
Warren	P	.....	.....	.....	13,938 w.i.	20,613	177,938	32,299	2,370	4,270	292
Oklahoma:											
Miami	M	8	8-6-4	.....	.....	4.5	1.5	2	.....	.....	.....
Oregon:						7,000	11,000	1,200	.....	.....	.....
McMinnville	M	2¼	14	wd. stave	.....	8,400	5,000 wd.	4,000 st.	.....	.....	2,000
Pennsylvania:											
Harrisburg	M	9,875	30	c. i.	.....	17,014	350,131	49,733	24,741	32,312	22,941
West Newton	P	800	10	c. i.	1 w.i.	7,500	15,200	4,100	820	.....	.....
Texas:											
Orange	P	.....	.....	.....	2,500	35,000	2,000	6,000	4,000	.....	.....
Sulphur Springs	M	.....	.....	.....	4,000 w.i.	33,250	6,700	7,850	.....	.....	.....
Terrell	M	3,000	12	c. i.	6,000 w.i.	13,800	3,000	4,500	.....	.....	.....
						2,800 w.i.	5,000 w.i.	.....	.....	.....	.....
Waco	M	.....	20	.....	115 miles cast iron, all sizes				.....	.....	.....
Virginia:											
Winchester	M	7,000	10	c. i.	21 miles, 4, 6 and 8-in. c. i. pipe.		1 wd	½ wd.	.....	.....	.....
Washington:											
Spokane	M	66,682	24	steel	.....	4,651	249,200	29,016	38,486	32,189	31,135
		21,076	28	steel	.....	16,280 wd.	175,839 wd.	5,961 wd.	.....	.....	32,307 st.
		64,094	30	steel	.....	37,836	830,173	85,012	54,704	81,368	4,265 wd
							Kalam'n	Kalam'n	Kalam'n	Kalam'n	Kalam'n
Wisconsin:											
Monroe	M	.....	.....	.....	.....	27,600	16,400	6,100	.....	2,700	.....
Wyoming:											
Laramie	M	15,120	16	c. i.	3,000 w. i.	27,000	19,000	800	2,200	3,600	3,000
		16,604	14	c. i.	.....	.....	.....	.....	.....	.....	.....

extraordinary labor conditions. During 1916, 185.6 miles of country roads were given bituminous surface treatment, and 116.5 miles were treated with dust-laying oil.

THE COUNCIL OF NATIONAL DEFENCE

Composition of Council and of Advisory Commission, Boards and Committees Under Each—Some of the Work Accomplished.

Much is read on all sides concerning the Council of National Defense, but the newspapers have confined themselves almost exclusively to the more picturesque features of its activities, and have failed almost entirely to present in any exact way a description of its composition, the committees through which it works, and the relation of these to each other and to other organizations working with it. The secretary of the commission, Grosvenor B. Clarkson, has therefore asked the business and technical press to give this information in order that the people may be the better enabled to appreciate the work that it is doing and how they can themselves assist.

The council itself consists of the six Secretaries of War, Navy, Interior, Agriculture, Commerce, and Labor. Acting with, under, and by authority of the Council is an Advisory Commission of seven—Daniel Willard, Howard E. Coffin, Hollis Godfrey, Julius Rosenwald, Bernard M. Baruch, Samuel Gompers and Franklin H. Martin. W. S. Gifford is Director of the Council and Advisory Commission, and Grosvenor B. Clarkson is Secretary of both.

Under each there have been created various boards, sections and committees. Under the Council are Boards of General Munitions, Munitions Standards, Aircraft Production, and Commercial Economy; a Medical Section and Section on Co-operation with States; Committees on Inventions, Shipping, Women's Defense Work, Coal Production, the Interdepartmental Advisory Committee, and Co-operative Committees on Purchase of Army Supplies (U. S. Chamber of Commerce); also the National Research Council.

There are seven committees of the Advisory Commission, those on Transportation and Communication, Mr. Millard; Munitions, Mr. Coffin; Engineering and Education, Dr. Godfrey; Supplies, Mr. Rosenwald; Raw

TABLE NO. 3—CONNECTIONS AND APPURTENANCES.

	Fire hydrants	For filling watering carts	Gate valves.	Service connections.	Motors and elevators Meters	Motors and elevators supplied	Private Fire Connections: Number	Private Fire Connections: Size of taps	Private Fire Connections: Kind of meter
Arkansas:									
Hope	129	1	73	1,100	900	.....	3	2, 3 & 6	.....
California:									
Los Angeles	5,727	.....	9,278	105,280	85,260	.....	230	1½ to 8	none
Colorado:									
Lamar	27	None	110	630	510	none	none	.....	none
Connecticut:									
Ansonia	94	.....	.....	1,138	535	1	8	4 to 8	Hersey Detector & Protectus
Illinois:									
Chester	39	None	6	150	4	1	3	2	none
Lewistown	41	None	26	.....	300	1	none	.....	.....
Lincoln	207	.....	116	1,725	706	.....	37	2-4	none
Iowa:									
Marshalltown	323	.....	487	3,317	2,435	.....	5	4	none
Kansas:									
Dodge City	86	1	31	1,180	700	none	5	1½ to 3	none
Kentucky:									
Morganfield	80	None	120	250	100	none	none	.....	none
Maine:									
Farmington	49	5	90	475	2	3	5	3-4	none
Maryland:									
Baltimore	3,850	None	No record	125,000	4,500	25	No record	3. 4 & 6	none
Massachusetts:									
Dalton	110	.....	60	911	none	4	3	2-4	.....
Danvers	309	12	580	2,529	35	.....	14	4-6	Detector
Falmouth	232	4	.....	1,400	25	.....	.....	3½-1	Hersey Detector
Woburn	437	19	699	3,355	756	10	15	1-6	none
Michigan:									
Detroit	7,064	.....	11,069	132,030	46,991	.....	.....	2-12	none
Minnesota:									
Ely	50	4	.....	.....	76	none	1	2	none
Minneapolis	5,627	.....	587	60,000	58,000	.....	.....	.....	.....
Moorhead	147	2	84	600	600	.....	.....	.....	.....
Nebraska:									
Aurora	.....	2	.....	700	700	.....	.....	.....	.....
Fairbury	30	2	30	1,000	1,000	none	3	2	.....
New Hampshire:									
Lancaster	66	None	90	500	1	1	none	.....	.....
Pembroke	62	None	16	300	none	none	1	6	none
New York:									
Canastota	90	2	60	650	618	.....	5	2-4-6	.....
Oneida	143	None	263	1,300	1,280	3	9	4	none
Oswego	490	.....	340	5,000	250	2	30	4 to 12	none
Rochester	5,589	None	9,358	46,100	48,400	.....	480	4-8	Hersey Detector
Watervliet	170	3	175	3,000	50	none	10	4-6	none
Ohio:									
Montpelier	84	3	.....	840	450	.....	4	1½	none
Oberlin	117	1	82	1,069	947	none	5	2-4	none
Warren	253	None	.....	5,270	4,054	none	.....	2	.....
Oklahoma:									
Miami	79	2	24	1,462	1,462	none	22	2	none
Oregon:									
McMinnville	64	1	88	868	204	none	17	2	.....
Pennsylvania:									
Harrisburg	1,112	.....	2,266	18,794	12,890	7	.....	6	none
West Newton	52	None	68	500	275	2	2	2-6	Hersey Detector
Texas:									
Orange	48	2	14	600	565	.....	4	2	none
Sulphur Springs	100	1	36	1,000	400	none	3	4	National
Terrell	85	None	107	812	749	none	none	.....	none
Waco	525	.....	700	9,500	5,250	none	25	6	none
Virginia:									
Winchester	110	.....	35	1,800	10	.....	4	3-6	.....
Washington:									
Spokane	2,230	83	2,822	25,821	16,229	.....	74	4-6	none
Wisconsin:									
Monroe	116	.....	6	724	642	2	1	6	none
Wyoming:									
Laramie	55	.....	45	1,300	none	none	6	2	none

Materials, Mr. Baruch; Labor, Mr. Gompers; and Medicine and Surgery, Dr. Martin.

Each of these committees has co-operative committees, there being 37 of these in all, as follows: With the Transportation and Communication Committee, Committees on Telegraphs and Telephones, Railroads, and Electric Railroads. With the Munitions Committee, Committees on Automotive Transport, and Public Utilities. With the Supplies Committee, Committees on Cotton Goods, Woolen Goods, Knit Goods, and Shoes and Leather. With the Raw Materials Committees, Committees on Alcohol, on Aluminum, on Asbestos, Magnesia and Roofing, on Brass, Cement, Chemicals, Coal Tar By-Products, Lead, Lumber, Mica, Nickel, Oil, Rubber, Steel and Steel Products, Sulphur, Wool, and Zinc. With the Labor Committee, Committees on Wages and Hours, Mediation and Conciliation, Welfare Work, Women in Industry, Information and Statistics, Press, Publicity, and Cost of Living. With the Medicine and Surgery Committee, a Committee on Standarization, and a General Medical Board.

The works of the Council of National Defense is carried on largely through the assistance of civilians who serve without pay. In the service of both Council and Advisory Commission there are but eighty paid employees, most of them clerks and stenographers. Of the non-salaried civilians there are more than one hundred highly trained men from many fields of industry and science who are giving their entire time without any compensation and in addition are paying their own living expenses in Washington; while several hundred others give a large part of their time in different ways and places.

The Council, although created by Act of Congress of August 29, 1916, was not fully organized for business until March 1. It was charged, among other things, with the "coordination of industries and resources for the national security and welfare" and the "creation of relations which will render possible in the time of need the immediate concentration and utilization of the resources of the nation."

The following are a few of the accomplishments of the Council, some of which have been given wide publicity but others of which have not:

The mobilization of the 262,000 miles of railroads of the country for the Government's defense;

The close-knit organization of the telephone and telegraph companies of America to insure to the Government the most rapid and efficient wire communications;

The settlement of the recent threatened national railroad strikes;

The very general acceptance by labor and capital of the suggestion of the Council that existing labor standards should not be changed until the need for such action had been determined by the Council with the steadying influence on industry growing out of such action;

The procurement of 45,000,000 pounds of copper for the uses of the Army and Navy of the United States at less than one-half of the then current market price—a saving to the Government of approximately $10,000,000.

Similar accomplishments as to steel, zinc and aluminum.

The completion of the inventory, for military purposes, of 27,000 American manufacturing plants;

The money saving to the Government, through appointment over the country of committees of business men to assist the quartermasters' department of the Army in the economical and efficient purchase of supplies;

The saving to the Government of millions of dollars by the proper co-ordination of purchases through the agency of the General Munitions Board of the Council of National Defense;

The creation, under the medical section of the Council, of a General Medical Board, consisting of many of the most highly qualified surgeons and physicians of the country;

The selection by the same section of thousands of doctors specifically qualified for membership in the medical officers' reserve corps, and the standardization, far on its way to completion, of surgical instruments and supplies;

The creation by the Council of the Aircraft Production Board, which is setting out to make 3,500 air planes and to train 6,000 aviators this year;

The very definite results obtained by the Council's Committee on Coal Production in the procurement and expeditious shipment of coal, both in the civilian and federal interests;

The successful initiation of a movement to co-ordinate activities on the part of the States of the Union for the national defense, brought to a clear and workable focus by the conference of states held recently in Washington at the call and under the auspices of the Council;

The organization of a Railroad Committee to send to Russia; and

The enlistment of reserve engineer regiments to aid in rehabilitating the railroads of France.

UTILIZING WASTE CANS.

The municipality of Hornsey, England, under the direction of the borough engineer, E. J. Lovegrove, has devised a method of utilizing the tin cans in the refuse brought to the refuse destructor, by desoldering and baling the tin. This itself is not new, but the novel feature consists in utilizing the heat of the flue gases for melting the solder and tin. Hornsey already had a hydraulic press for baling the tin, and the additional capital outlay was only about $1,000.

The amount of tin cans received averages about 1.35 tons per year per thousand population; while there is 0.65 ton additional of light tin scrap, galvanized and enameled steel. For a small community Mr. Lovegrove knows of no commercially practicable method of recovering the tin, but the tin and solder are removed by heat, the solder being collected in a trough and the dross removed from it. The melting is performed by dropping the cans, when sorted out from the refuse, into a furnace through which are passed the fuel gases from the destructor on their way to the chimney. The cans are then removed and put into a hydraulic press and compressed into bales about 2 ft. 3 in. by 15 in. by 4 in. deep. When removed, no banding is necessary, as the bales hold together and can be loaded directly into a truck for delivery to the steel works.

The light scrap is sorted out and baled without treatment and sent to the steel works. The galvanized scrap is baled without treatment and delivered to degalvanizing works. The enameled scrap has to be specially treated by firms dealing in that material, who remove the enamel and recover the steel. Both solder and steel scrap find a ready sale, and produce a revenue in the Hornsey district of more than $1,000, "thus doing away with the necessity of paying for the cartage of material to waste tips, which still obtains in many districts. The plant at Hornsey, by the adoption of the above-mentioned furnace in connection with the destructor plant, has rendered possible the carrying out of the work as part of the depot routine, no additional labor having been employed." Where a destructor is not available, flue gases from any furnace, boiler or other plant can be used for melting the solder.

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COST OF PUBLIC WORK.

Our pleas for continuation of public work have drawn out communications from two or three officials to the effect that the cost of such work has increased so greatly as to discourage all work except that absolutely necessary. We have been at some pains to learn just what increase is necessary owing to higher prices, taking concrete as typical and as entering into many kinds of work.

For one thing, it appears to be indicated that some contractors are taking advantage of conditions to endeavor to obtain more than a fair profit, just as many dealers in food are doing. For example, in a city near New York a few days ago, one contractor asked 95 cents a lineal foot for concrete curb 6 and 8 by 17 inches on a broken stone foundation, while another took the contract for 40 cents. The latter is perhaps too low to leave much profit, but the higher price was exorbitant. Another city near New York on June 7th let three contracts for curb at 40 cts., 56 cts. and 58 cts. respectively to three different contractors, and one for cement sidewalk at 17 cts. a square foot.

Cement is now selling at $1.60 per barrel net at the mill, as against $1.30 to $1.35 last year. Sand and stone cost the same as last year in this vicinity, and gravel costs 35 cts. a cubic yard more. Labor has advanced from $2.00 to $2.50 per day. In the case of concrete roads this would amount to an increased cost per square yard of 9 to 11 cents for cement, nothing for sand and stone, and 10 cts. for labor, or 19 to 21 cts. additional per square yard. For 6-inch concrete base for pavement, the increase would be less than this or about 6 cts. for cement and 7 cts. for labor, or a total of 13 cts. These take no account of the cost of grading, which would be increased about 25 per cent if performed entirely by hand labor.

These figures show about the same increase—20 per cent—as that estimated by the State Highway Department of Pennsylvania in figuring on work for this year. In other lines the increase is still less, this being the case with bituminous paving materials, we believe. This amount is by no means negligible, of course, but scores of cases can be cited from previous years where bids on a given contract have varied considerably more than 20 per cent, this amount having been saved to the city by wide publicity that has secured the bids of a large number of contractors. By wise advertising, and lenience as to time for finishing the work to allow for possible scarcity of labor, we believe that it will be possible to obtain as low prices as were obtained in previous years by those cities that paid less attention to these matters. An encouraging feature is the fact that many contractors, because of scarcity of labor, have developed various methods of reducing labor costs by the use of mechanical appliances. Some, for instance, have entirely eliminated the wheelbarrow gangs for supplying sand and stone to concrete mixers. We expect to describe a number of these labor-saving schemes in future issues.

IMPORTANCE OF PROPER USE OF MATERIALS.

An illustration of the importance of apparently minor details in determining the success or failure of engineering work is given by an article in this issue. In this case the presence on a pipe of a mere smear of cement from a grout-soaked packing apparently prevented the adhesion to the pipe of a bituminous jointing material and caused joints to leak that otherwise would probably have been satisfactorily tight. An effort had been made to wipe the pipe clean before running in the hot jointing material, but apparently the damage was done by an amount of cement so small as to escape observation. Had not the engineers taken pains to learn the cause of the numerous leaking joints, the blame for them might have been placed on the jointing material instead of on a method of using it that proved to be inadvisable.

Undoubtedly many failures, partial or entire, of materials used in many kinds of municipal work are due to an improper or ill-advised use of such materials. Defective concrete is probably due to the cement less than one per cent of the time, a large percentage of the failures being due to improper aggregates, and a still larger number to improper methods in mixing. The use of one of several grades of road oil where or in the manner in which another should have been used, or in an otherwise improper way, has been the cause of numerous complaints against materials for unsatisfactoriness for which the carelessness or ignorance of the users (either engineer or laborers) was really to blame.

A. S. M. I. CONVENTION POSTPONED.

Last week the Executive Committee of the American Society of Municipal Improvements voted to postpone for about a year the annual convention of the society, which it had been intended to hold at New Orleans on November 12th to 16th of this year. This action was taken because of the war, so many members of the society having enlisted that there was doubt whether a successful turnout could be obtained, especially since the absence of these would throw so much responsibility upon those remaining in charge of the municipal work that even of these only a few might feel at liberty to leave home for the convention.

The WEEK'S NEWS

State Highway Work in Texas, Illinois and Maine—Health Activities in Milwaukee—Water Waste Elimination in Spokane—Chicago Changes Gas Rates and Standards—New York Gets Reduced Electric Rate—Police Survey of Harrisburg—Indianapolis Police Chief Convicted—Finances of American Cities—New Jersey Plans Civil Service Reform—Dallas Raises Employes' Salaries—Tunnel Plans for New York and New Jersey—Rapid Transit in Chicago and Cleveland—Builders of the Army Cities—Springfield, Mass., Sets Clock Ahead.

ROADS AND PAVEMENTS

Economy of Good Roads.

San Antonio, Tex.—That the saving on gasoline, oil and tires for automobilists alone, as a result of improved roads will, in a year's time, more than pay for the road is an interesting statement by D. E. Colp, secretary of the Texas Good Roads Association and Bexar County Highway League, supported by actual figures. For a basis the Post Road from San Antonio to Austin was taken and actual count showed that during February an average of 931 cars passed over the road daily, which means 335,160 for a year. Before the road was improved it required an average of eight gallons of gas for the trip and this has been reduced to five gallons, a saving of three gallons per car. This in a year's time for the 335,160 cars, at 22c. per gallon on the 1,006,380 gallons used, means $221,403.60. The estimated saving on oil is $20,000 and on tires $127,000, bringing the total to $368,403.60 saving on these three items alone. The total cost of building the road was but $239,800, which means that the saving for one year was $128,603.60 more than the cost of the road. These figures are considered especially pertinent just now with the State Highway Department formed and the state law requiring a minimum license fee of $7.50 on automobiles effective July 1. It is estimated that this fee will bring into the highway fund approximately $1,360,000 annually, one-half of which is returned to counties from which it came to be used for road maintenance, while all the balance, aside from about 8 per cent. necessary for administrative purposes, also will be used for road construction and maintenance. The 8 per cent. pays the salaries for engineering supervision and buys the number plates, the commissioners not receiving a salary. To this may be added the $4,515,750 appropriated by the Federal government for Texas roads for the five years ending 1921, nearly $1,000,000 of which already is available as soon as this state qualifies for it.

Highway Funds of Illinois.

Springfield, Ill.—The state will have $7,399,958 to expend for the two years commencing July 1, 1917, for the construction of good roads, or over forty per cent. more than it had for the two previous years. The fiftieth general assembly has appropriated $3,699,979 for the purpose of building roads, to be paid out of the automobile license fund, and the Federal government appropriates an equal amount, making a total of $7,399,958, against a total of $5,200,000 for the two preceding years. With seven million dollars from the state and federal government and with the counties appropriating a like sum there will be fourteen and one-half million dollars for building good roads in the state for the next two years. Secretary S. E. Bradt of the state highway commission, who is to be superintendent of highways in the department of public works after July 1 has made the following statement: "The appropriations made by the Fiftieth General Assembly for road improvement, are as follows: Unexpended balance, $1,173,979.00; to meet federal allotment, $1,326,000.00; for state aid work, $1,200,000; total $3,699,979. Amount appropriated and to be appropriated by federal government and the counties of Illinois, $3,699,979. Total available for expenditures for road improvement in Illinois during 1917 and 1918, $7,399,959. Appropriation by forty-ninth general assembly for road improvement—Unexpected balance, $600,000; state aid roads, $2,000,000; total, $2,600,000. Excess appropriation in 1917 over 1915, $1,099,979. It was not deemed wise to appropriate at this time any further sums for road improvement because of the high price of material and labor, as well as the scarcity of labor and the possible inability of contractors to obtain material owing to the shortage of cars in which to ship such material. It is understood, however, that in the event conditions are such as to allow the expenditure of a reasonable proportion of the amount appropriated as above for state aid work by September, 1918, that county boards will then be advised to provide funds by levy to meet an additional allotment to be made available by the fifty-first general assembly on April 1, 1919, through an emergency appropriation of $1,000,000. The entire amount appropriated for road improvement aggregating $3,699,979 will be paid out of the fund derived from motor license fees, which have been collected for that purpose only—hence these appropriations in no way add to the general taxes of the state. The new motor law provides for the following rates to take effect on January 1, 1918, and January 1, 1920:

10 h. p. and less—1917, $3.00; 1918, $4,50; 1920, $6.00.
25 h. p. and more than 10—1917, $4.00; 1918, $6.00; 1920, $8.00.
35 h. p. and more than 25—1917, $6.00; 1918, $9.00; 1920, $12.00.
50 h. p. and more than 35—1917, $8.00; 1918, $16.00; 1920, $25.00.
More than 50 h. p.—1917, $10.00; 1918, $20.00; 1920, $25.00.
Motorcycles—1917, $2.00; 1918, $3.00; 1920, $4.00.
Electric vehicles to and including 2 tons—1917, $5.00; 1918, $10.00; 1920, $12.00.
Electric vehicles over 2 tons—1917, $10.00; 1918, $20.00; 1920, $25.00

"This law further provides that the fund thus created known as the "road fund" can be used only for two purposes: First—For the payment of the principal and interest of any bonded indebtedness incurred by the state of Illinois for road construction and second, for the improvement of the highways of the state. It will thus be seen that both purposes are primarily for the improvement of our roads and that this money constitutes a special fund paid in and set aside for that specific purpose."

Work of Maine Road Commission.

Augusta, Me.—During the past year the commission has been asked to make but few changes in the location of the designated state aid roads, but probably not less than one hundred requests have been made by municipal officers for changes in the location of work from one part of the designated state aid road to another part of the same road, according to the annual report of the members of the state highway commission, Philip J. Deering of Portland, William M. Ayer of Oakland and Frank A. Peabody, filed with the governor. The commission renews its recommendation made one year ago that for all towns located upon the state highway system at least, the traveling public will be convenienced in far greater numbers and the town will relieve itself of the burden of maintenance by the continuous expenditure of the state aid joint fund upon the state highway until the highway is completed. During the past year the first attempt at patrol maintenance on any extensive scale was undertaken. Under the laws of 1915, 3,379 miles of road located in 423 towns were under constant daily care of 373 patrolmen. Patrol work started about April 15, and continued until the first of November. Substantially $275,000 was expended on this work. "As must be expected with the undertaking of any new method for doing work there was more or less objection on the part of the municipal officers and there has been more or

less criticism of the work done by patrolmen," says the report. The objection of the municipal officers to having patrol maintenance organized has generally shown itself to be on account of concentrating this work in the hands of one man and consequently not being able to employ a considerable number of voters for longer or shorter periods, when no other form of employment was in sight. The commission thoroughly believes that for the most part patrol maintenance has been successful. The commission has received comments to this effect from many people who have measured their judgment solely by results obtained on the roads. Many of the most interested supporters of the good roads movement have suggested that patrol maintenance ought to be extended to cover all of the main thoroughfares in every town. Under the recent Shackleford legislation, the state of Maine can draw federal aid for the highways for the coming four years, as follows: 1917, $97,500; 1918, $146,250; 1919, $195,000; 1920, $243,750.

SEWERAGE AND SANITATION

Health Commissioner Recommends Improvements.

Milwaukee, Wis.—Several changes in the various divisions of the health department are suggested by commissioner George C. Ruhland in his annual report submitted to the common council. Among the chief recommendations are: The immediate engagement of experts to study the special needs of a filtration system for Milwaukee, considered necessary to finally solve the city water problems. Organization and conduct of all medical inspection of schools, public as well as private, under single authority of the health department, for economy and much needed efficiency; a district nursing plan. The extension of health publicity and propaganda funds to meet the increasing needs for public health education. The establishment of a municipal hospital, preferably in combination with a relocated emergency hospital. More adequate quarters for the health department to remedy the present inadequacy. Equal representation on the board of estimates with other city departments. The licensing of lodging and boarding houses to advance the ultimate solution of the housing problem; consideration for municipal lodging houses. Abandonment of day camps in child welfare work and enlargement of the fresh air pavilion. Completion of equipment for the preventorium for children. In the division of food inspection, commissioner Ruhland recommends a proper inspection law to eliminate diseased and unwholesome meat from the market; guard the water supply on farms supplying milk to Milwaukee; keepers of food establishments should require employees to furnish health certificates; decided improvements in handling foods during transportation. In his report on the division of communicable diseases, the commissioner recommends a more efficient plan to control the spread of diseases through the schools. The report also recommends that chicken-pox be placed under control and placarded.

Auto Theater for Health Education.

New Orleans, La.—The Capital City Auto Company has turned over to the State Board of Health a Studebaker car equipped to be used throughout the state for exhibiting motion pictures for health educative purposes. In accepting it for the Board Dr. Oscar Dowling gave the machine a try-out and pronounced his experiment successful. The car is to have a large part in a forthcoming health campaign. The machine will be called "The State Board of Health Theater on Wheels," and will make its maiden tour to Baton Rouge. It will be fitted with a film projector, and other necessary equipment, and promises to appeal to the children of the rural districts, many of whom never or seldom have the opportunity to see the motion pictures.

Industrial By-Products of Sewage in England.

Bradford, England.—The sewage works of the city of Bradford recover the grease turned into the sewers by many of the wool washing and scouring establishments and thereby convert into a highly profitable by-product a waste effluent formerly difficult and costly to dispose of. The sales of this recovered grease amounted in 1916 to £80,000 ($389,320), an increase of £19,000 ($92,463) over 1915, owing to the high price now obtainable, which is about £25 ($122) per ton; and it is estimated that in 1917 £70,000 ($340,655) will be derived from that source, in addition to £5,000 ($24,332) from the sale of manure or fertilizer made from the sludge after the grease has been extracted. The municipal expense of maintaining the sewerage department has steadily declined in recent years, and it is believed that the enterprise will be self-supporting in 1917. Samples of the grease and manure were anlyzed by government experts, who report that the grease is of great value to the leather-dressing trade and to certain branches of the textile industries. The whole of the waste effluent is not treated for grease recovery because the plant is not adequate; the government urges an increased output.

WATER SUPPLY

Big Saving Follows Water Waste Survey.

Spokane, Wash.—Nearly one and a half billion gallons of water were saved by leak stoppage last year, according to the annual report of engineer L. O. Chambers of the waste survey of the water division. The net saving, says the report, works out at an average of 3,877,000 gallons every 24 hours. In all 2,416 leaks, each with a daily average waste of 1,760 gallons, were plugged. Total water pumpage for 1916 amounted to 8,613,762,000 gallons, according to the water division's annual report. The total pumpage is less than for any year since 1912, and the drop is largely due to the stoppage of leaks. The monthly average pumping in 1913 was 1,136,000,000 gallons; in 1914 it dropped to 926,000,000; the 1915 figure was 768,000,000, and last year another drop to 718,000,000 gallons was experienced. The division now has 576 miles of pipe in service in the city, of which 357 miles are in the distribution system, the balance being used for private services.

City Sued for Hydrant Rent.

Livingston, Mont.—The city of Livingston has been made defendant in a suit in which the Livingston Water Co. seeks to recover $45,350 alleged to be due for hydrant rental. The city and water company became involved in a dispute in 1912 over the hydrant rental, the city offering $35 per month for each hydrant in the town, while the company demanded $100 per hydrant, as provided in the original contract between the water company and the city. Mayor Veit stated, after the filing of the suit, that the supreme court of this state has ruled that the company has no contract with the city, and therefore cannot hold the city to the contract price for hydrant rental.

Raise Rates for Large Consumers.

Flint, Mich.—Announcement that the cost of supplying water at the filtration plant has increased so that it has been necessary to increase the rate for big consumers from five cents per gallon to eight cents per gallon minimum for water consumed above 75,000 gallons per month, has been made by F. N. Baldwin, waterworks superintendent. Action increasing the rates of the large consumers, but not in any way affecting the small consumers, has been taken by the water board which says that it is impossible to furnish water in any quantities at the present minimum rate of five cents per thousand gallons without a serious loss to the waterworks and that all water furnished to consumers at said five cent rate is furnished at an actual loss. Beginning with the July, 1917, bills the water will be sold by cubic feet and the present minimum rate of five cents per 1,000 gallons for amounts in excess of 75,000 gallons in any one month will be raised to eight cents per 1,000 gallons. All other rates will remain as at present or as near as can be figured in cubic feet instead of gallons without using fractions of cents, allowing seven and one-half gallons per cubic foot.

STREET LIGHTING AND POWER

New Rates and Standard for Chicago Gas.

Chicago, Ill.—Passage of the new gate rate ordinance by the city council has paved the way for the expenditure of millions of dollars by the Peoples Gas Light and Coke Company in the complete rebuilding of its plants. The ordinance was said to be one of the most important the council has passed in years. The following is the cost per thousand feet of gas under the new ordinance with the sliding rate scale approved by the council: 1,000, 75½ cents; 1,500, 73⅔ cents; 2,000, 72¾ cents; 2,500, 72 1/5 cents; 3,000, 71 5/6 cents; 4,000, 71⅜ cents; 5,000, 71 1/10 cents; 10,000, 70½ cents. The average consumer in Chicago uses 2,500 cubic feet of gas per month. His bill is $2 under the present ordinance. Under the new rate his bill will be $1.80. The new gas ordinance is declared by its advocates to mark the beginning of a new era in the relations of the Peoples Gas Light and Coke Company with its consumers and the city of Chicago. There will be no court fight, as the ordinance is acceptable to the company. A flat rate is eliminated—a new precedent for Chicago. The sliding scale rate will permit the company to sell gas by wholesale as well as by retail quantities. The most important feature of the ordinance, aside from the rates to be charged, is the changing of the standard from a candlepower requirement to a heat unit basis, which was the object of a strong newspaper campaign by the company. This will enable the company to manufacture coke oven gas, and one of the provisions of the ordinance is a requirement that the company begin construction of its new plant within ninety days and that it must be ready within three years to furnish 8,000,000,000 cubic feet of gas a year. The new plant, the company estimates, will cost $10,000,000. The profit sharing for consumers provision is a new feature of public utility rate ordinances in Chicago. The company is to be required to divide with its consumers all net earnings in excess of $4,000,000 a year. The company shall retain 75 per cent of the earnings between $4,000,000 and $4,500,000 and refund the remaining 25 per cent to its consumers. All profits in excess of $4,500,000 shall be split "fifty-fifty" between the company and its consumers. The ordinance, instead of fixing rates and standards for a five-year period, as has been customary under the city's enabling act, really is only effective for twelve months. At the end of a year it is figured that the period of readjustment to the new method of manufacture and the new standard of gas will be over and changes may be made.

Another Electric Rate Reduction for New York.

New York, N. Y.—The New York Edison Company has reduced its maximum rate for electricity to seven cents per kilowatt hour, taking effect July 1. A letter to the Public Service Commission stated that the company would accept the reduction directed by the commission. The action of the commission informing the company that it must put the lower rate into effect followed hearings before the commission in which the company attempted to establish that a reduction from 7½ cents to 7 cents on July 1 would be unwarranted. The commission, however, held that the company had not shown sufficient cause to warrant a maintenance of the 7½-cent rate which was fixed last November and has been in effect since January 1. The new rate will continue for at least six months. On December 3 the company must appear before the Public Service Commission again and state where it intends to return to the 8-cent rate in force prior to January 1, 1917, or continue with the 7-cent rate until new conditions arise. The last fiscal year that the 8-cent rate was charged the company earned $5,800,000 net. At the rate the company is now doing business its net earnings for the current year have been estimated at about $7,000,000. It was estimated that the company would probably find itself compelled to charge not more than 6 cents next year either under an order of the commission based on the net earnings of the company or through the enactment of a law fixing the rate at that figure. The reduction from the 8-cent rate represents a saving for the consumers of about $1,750,000 for the current year. Chairman Straus of the commission asked city chamberlain Maltbie, who represented the mayor, to express an opinion. "The company," said Mr. Maltbie, "having reserved the right to restore the old rate of 8 cents at the end of the year, I presume the city should reserve the right to demand that it be reduced to 6 cents." The company filed a brief at first opposing the cut on the grounds of increasing operating costs. At the hearings before the commission it was brought out that the company is about $60,000,000 ahead of its expenditures, and can go on piling up money at the present rate. It was shown that in the fiscal years of 1907, 1908 and 1909 the company paid 6 per cent on $45,000,000 of stock; that the same rate was paid in 1910 on $49,000,000, from 1911 to 1913 inclusive on $50,000,000, and in 1914 on $66,000,000. On this latter amount 6¾ per cent was paid in 1915 and 7 per cent in 1916. Besides paying these increasing dividends on increasing stock values the company increased its corporate surplus from $10,000,000 to $36,000,000, increased its contingency reserve to $22,000,000, and paid interest of about $2,500,000 a year on its bond issue of about $39,000,000. It is possible that the commission may make an appraisal of the company's property, a task which will take about a year, but which will serve to adjust rates on a solid foundation. During 1916, while the 8-cent rate was being charged, the company, it was said, earned $5,800,000 net, and it could reduce the present rate to 7 cents and earn $7,000,000, the difference representing the increase in business. Estimates made of the value of the company's property by public officials ranges from $70,000,000 to $85,000,000. H. M. Edwards, the company's auditor, presented figures showing that the cost of operation of the company's plant in 1917 would be $19,029,200, $4,016,024 more than in 1916. Mr. Ransom, counsel for the commission, brought out the fact that the 10 per cent increase in wages included the 7 per cent bonus given to the employes, so that the real net increase was only 3 per cent. It was also disclosed that the company had estimated its income on the basis of a 7 per cent charge, that coal was figured at the rate of $7 a ton, and that the receipts from the Third Avenue Railway Company appeared in the report as $695,573. Figures submitted by the Third Avenue Company made the total $300,000 more. It also came out that some of the charges current were based on the cost of coal so that the cost of power went up with the price of coal. Mr. Ransom thought that the Edison Company charged against operating expenses $1,665,263 too much. It also appeared that the company had loaned about $4,000,000 at 3½ per cent interest, and that it was paying 6 per cent on about $3,500,000 which it owed to the Consolidated Gas Company. Mr. Ransom thought it would have been wiser if the company had paid its debtor from the money due it from its creditor.

Light Rate Increased.

Montpelier, O.—Owing to the extremely high price of fuel the Board of Trustees of Public Affairs has been forced to increase the rates for light current to 12 cents per k. w. hour. The expense for fuel so far in 1917 has been in excess of the fuel cost for the entire year of 1916. The former rate was 10 cents.

FIRE AND POLICE

Report Follows Police Survey.

Harrisburg, Pa.—Take the police out of politics, is the gist of the report of Clement J. Driscoll, the expert of the Bureau of Municipal Research of New York, who was employed by the Chamber of Commerce to make a survey of police conditions in Harrisburg. His suggestions, embodied in a report of ten thousand words, created a decided stir among officers and men of the force. Driscoll also recommends that the chief of police by appointed by civil service code, and not by political preference. He decries the wholesale removals upon the coming into office of every new mayor and says that officers who owe their appointment to political preferment have nothing to look forward to but dismissal. The report lays bare the vice conditions of

Harrisburg in frankest fashion, saying: "The statutes prohibit and the police and constables are required under the law to use every effort to suppress prostitution and gambling. This fact is well known, not only by the officials of the community, but by the general public as well. Dealing solely with the municipal police force, it may be said that the officials in charge of the police bureau have adopted a policy of 'toleration.' By this policy of police 'toleration' is meant permitting commercialized prostitution in certain parts of the city without police interference or prosecution. Because the statutes prohibit prostitution and because the responsibility for its suppression is by law placed with the police, the bureau keeps no records indicating the location of premises suspected as being operated as disorderly places. While no moral survey of the city was conducted and no effort made to study the vice conditions in detail, except in the degree necessary to determine the policy of the police bureau and the effort made to comply with that policy, a tour of observation showed that assignation hotels and houses of prostitution operate openly and without fear of police interference. It may be true that the commercialized houses of prostitution are confined to a definite section, but commercialized prostitutes are also operating flats, apartments and rooming houses and soliciting upon the main streets of the city. Notwithstanding these conditions, which are known to almost every well-informed official, and indeed to a large number of citizens of the city, every three months regularly members of police force attended a session of the court of quarter sessions and present to the judge of that court over their signatures sworn statements that they have no knowledge of the existence of any tippling and disorderly houses. It is interesting to note that for the filing of this quarterly report, which in most cases contains the word 'none' in reply to each of the 24 questions asked, $2.50 is paid by the county to the officer reporting." On behalf of the men he recommended that the city pay for their uniforms and revolvers. As it is, the city supplies only badge, whistle and nippers. It costs a policeman about $75 a year for uniforms. He considered that at least twenty more men were needed on the force. The principal recommendations made for the improvement of the service follow:

Civil service for police force and chief of police.
Substitution of a police magistrate's court for mayor's hearings and the turning over to this magistrate of all criminal work now done in the alderman's courts.
No toleration by the police department of prostitution and gambling. Police officials to be directed to begin a vigorous campaign against vice conditions which exist in the city. Administration to adopt a policy of suppression.
Better care of outlying and business sections with bicycle and motorcycle patrol with suburban booths like those in New York.
Ages of police at time of appointment between 21 and 30, with average of 25.
Detectives to be chosen from uniformed force and to serve only so long as work is satisfactory.
A court for women with matron in charge; hearing of juveniles out of court.
Revision of traffic regulations with suggestion of sending officers to New York to study conditions there.
Better lighting of stores in business district at night.
Suitable court room for police hearings in keeping with dignity of city.
Introduction of modern record system.

Civil Service for Police.

Harrisburg, Pa.—Police officials in the third class cities in the state are gratified at the passage by the legislature and the signature by the governor of a bill providing for civil service in police departments in cities of that class. Political control of the departments has been responsible for inefficient and handicapped work. Despite opposition from politicians the measure passed when they were off their guard.

Police Chief Guilty of Election Frauds.

Indianapolis, Ind.—Samuel V. Perrott, chief of the Indianapolis police, and five others were found guilty of a conspiracy to commit election frauds in connection with the 1914 registration and election by the verdict of a jury in the United States District Court here. The others convicted were Roy A. Pope, police captain; Wayland Sanders and Morton C. Hulse, police sergeants; Lee Stringer, city detective, and Herman F. Adam, city inspector of weights and measures. A seventh defendant, Frank M. Johnson, a patrolman, was acquitted. Seven others indicted pleaded guilty some time ago. The jury's verdict was reached after three hours of deliberation. The indictment charged violation of Section 19 of the Federal Penal Code, which provides imprisonment and fine for participants in a conspiracy to injure persons in the exercise of civil rights. One count of the indictment alleged the prevention of men from voting and the other charged an injury to candidates for Federal office in that a fair election was prevented by the conspiracy. The case grew out of a civil suit for damages for the alleged prevention of a negro from voting, in which the 1914 political conditions in one city precinct were exposed.

GOVERNMENT AND FINANCE

Commission-Manager Form Approved.

Sault Ste. Marie, Mich.—The city has adopted the commission-manager form of government by a majority of 527 after a hard political fight. Many of the present aldermen were strongly opposed to the new government. The new form will go into effect in about three months. The charter provides for the election of four commissioners and a mayor.

Business Man Appointed Manager.

Wheeling, W. Va.—After lengthy consideration of candidates, George O. Nagle has been appointed city manager of Wheeling. Mr. Nagle is president of the West Virginia Manufacturers' Association. The commission form of government, approved by the voters at a recent election, became effective July 1.

City Goes on Cash Basis.

Duluth, Minn.—The city of Duluth is now on a cash basis for the first time since 1911. The $100,000 bond issue authorized on April 30 by the city commissioners to wipe out the old deficit in the permanent improvement fund has gone into effect and with the taking over of the bonds into the sinking fund, the city's six-year debt was liquidated. After the transfer was made by Commissioner Voss, finance head, a statement was prepared by city auditor Campbell, showing the present status of the permanent improvement fund. The city is now on a cash basis in all its funds, while the permanent improvement fund has $33,695.47 available for street improvements or new buildings to be constructed during 1917. The bonds are in blocks of $20,000 each, maturing each year for five years, beginning in June, 1918.

Increasing Expenditures of American Cities.

Washington, D. C.—In 149 of the 213 American cities of more than 30,000 population the excess of expenditures for governmental costs, including interest and outlays for permanent improvements, over revenues during the fiscal year 1916 amounted to $86,013,326, or $3.68 per capita. In the remaining 64 cities the excess of revenues over expenditures was $12,422,256, or $1.40 per capita. Taking the entire 213 cities as a group, the excess of expenditures over revenues amounted to $73,591,070, or $2.28 per capita. The net indebtedness of these cities averaged $76.64 per capita—a figure nearly eight times as great as the corresponding one for the National Government. Eighty-nine cities, or nearly 42 per cent of the total number, are operating under the commission form of government. The foregoing are among the facts brought out in a report entitled "Financial statistics of cities having a population of over 30,000, 1916," soon to be issued by the Bureau of the Census, Department of Commerce. The aggregate revenues of the 213 cities during the year amounted to $994,710,241; the aggregate expenditures for current governmental costs, including interest, to $780,742,643; and the aggregate outlays, to $287,558,668. Of the total revenue, $695,106,895, or nearly 70 per cent, represented receipts from taxes of various kinds. The greater part of this amount, $623,300,805, was received from the general property tax, derived from assessments upon realty and personal property. The earnings of the public service enterprises of the cities of the group, mostly water supply systems, amounted in the aggregate to $99,797,175, and formed the largest source of revenue next to general

taxes. The revenues from these enterprises were considerably more than double the expenditures incurred in their operation, which aggregated $44,636,007. For all the cities taken as a group the per capita receipts from property taxes amounted to $19.74; from other taxes, $1.80; from earnings of public service enterprises, $3.09; from special assessments and special charges for outlays, $2.29, and from all other sources combined, $3.91. The highest per capita property taxes, $48.94, are shown for Brookline, Mass., and the lowest, $5.28, for Portsmouth, Va. The total expenditures of the 213 cities was $1,068,301,311. Of this the bulk, or $603,060,076, were the expenses of general city departments, including police, fire, schools, legislative, executive, etc. The sum of $287,558,668 went for outlays, $133,046,560 for interest on indebtedness; $44,636,007 for expenses for public service enterprises. The payments for governmental costs, including interest and outlays, exceeded the revenues by $73,591,070, or $2.28 per capita; but the revenues exceeded the current expenses and interest by $213,967,598, an amount equal to nearly three-fourths of the total outlays, which aggregated $287,558,668. In other words, the cities of over 30,000, taken as a group, are paying from their revenues all their current expenses and interest and nearly three-fourths of their outlays. This is a considerably better showing than was made by the 204 cities of over 30,000 during the preceding year, in which the revenues of these cities exceeded their expenditures for current expenses by $189,829,746, an amount equivalent to somewhat more than half their outlays. In sixty-four cities last year, as against forty-eight in 1915, the revenues were in excess of the entire expenditures. The net increase indebtedness during the fiscal year for all the cities taken as a group, $106,770,100, was considerably less than the corresponding increase during the preceding fiscal year in the 204 cities covered by the report for that year, which amounted to $142,731,834. These figures, as well as those for receipts and expenditures, the bulletin states, indicate a perceptible slackening in the rate at which American municipalities have been living beyond their incomes, although the practice of mortgaging the future has by no means been brought to a halt.

Civil Service Reform in New Jersey.

Trenton, N. J.—Extensive plans for the reform of the civil service in New Jersey are outlined in a statement by Dr. John D. Prince, president of the State Civil Service Commission, as reorganized under the law passed by the Legislature last winter. Dr. Prince announces the commission has already engaged the services of J. L. Jacobs, a Chicago expert, to standardize the salaries of all state employees. The decision has been reached by the commission to establish gradually courses of instruction whereby the profession of civil servants would be created. Dr. Prince says: "It has been a usual error on the part of men engaged in practical politics to regard civil service as a nuisance, a fifth wheel, impeding the activity of state and municipal departments, instead of helping along the work of government. This point of view has arisen, especially of late years, largely from a lack of co-operation between the heads of departments and the commissioners, whose duty it has been to administer the merit system. There can be no doubt that a remedy must be found to popularize civil service in the eyes of those whom the public has chosen to administer its common business and to bring our officials to see that the merit system is a real necessity for the efficiency of their own work. During the brief years in which civil service has existed in New Jersey, the legislatures and the state departments have unconsciously multiplied overlapping offices and have added to this confusion by creating misleading titles, often carrying with them salaries, not commensurate with the work to be done by their recipients. In consequence of this annually increasing disorder, civil service classifications are becoming more and more difficult. The present civil service commission, recognizing the exigencies of the situation and at the request of the governor, has secured the services of a competent standardizer, J. L. Jacobs, whose experience in Chicago and Milwaukee has turned the administration of those cities into models of civic method. It is the intention of the New Jersey Commission, however, not to rest content with mere standardization, but to hold one or more meetings, to which the governor and the heads of the state departments, as well as those of the more important municipalities, shall be invited, in order to express their views. What we need is more than a mere orderly classification. It is essential to make the state civil service a real career for young men to enter upon, which it distinctly is not at the present time. To accomplish such a result it will be necessary in New Jersey to follow, so far as possible, British-Indian precedents and establish within the state courses of practical instruction approved by the civil service commission, the successful following of which will place competitors in the position to rise in their chosen specialties. Of course, this can only be done gradually, and it has been suggested that we begin tentatively with courses for expert accountants and stenographers. We have two New Jersey institutions of learning, Princeton and Rutgers, whose services could be enlisted to further this work, and also a complete evening extension department of Columbia University already in operation in Newark, which could be of the greatest assistance."

Procedure in Abandoning Commission Form.

Madison, Wis.—Governor Philipp has signed the bill simplifying the method for the abandoning of commission form of government by a city if adopted. The question of abandonment must be submitted to a vote of the people and the direct question that shall be printed on the ballot is "Shall the commission form of government be abandoned?" Of the cities of the state that have adopted the commission plan most of them are enthusiastic over the results. In a few cities there are complaints. Because the old law on the subject of abandonment was ambiguous, it was deemed advisable to pass a new law on the subject. If a city votes to abandon the commission form, the next city election shall be held and conducted and the officers elected under the old form of government that existed before the adoption of the commission plan.

Salary Raises for Many Employes.

Dallas, Tex.—The city of Dallas will spend $59,510, approximately during the current year in raises to employes on account of the high cost of living. This amount will be paid, in nearly every instance, in raises of $5 monthly to employes getting less than $100 per month. About 1,000 employes will be affected. When the proposition of raises to meet the increased cost of living, occasioned, for the most part, by the war, was under discussion first, it was decided $10 monthly increase would be the proportion the employes should get. After a consideration of the budget, however, the available funds indicated, members of the board said, the salary advances must be cut in half. The street department was hit hardest, because advances were granted for teams as well as men. The advances in that department for all its divisions was a total of $21,150. Policemen will get $9,460 of the increase and firemen will get $10,000. Advances were granted in every department of the city to all employes receiving less than $100 per month, and the advances ranged as high as $7.50 in some instances.

TRAFFIC AND TRANSPORTATION

New York-New Jersey Tunnel Commission.

Trenton, N. J.—The much-discussed project of a series of tunnels from lower Manhattan to the New Jersey shore was advanced when governor Edge named the members of the new Hudson River Bridge and Tunnel Commission of New Jersey, which is to co-operate with the Bridge and Tunnel Commission of New York in the building of the tubes to help solve the New York-New Jersey traffic problem. The proposition favored by the New York commission is the construction of a pair of tunnels for foot passenger and vehicle traffic from about Canal Street on the New York side to Hoboken, at a cost of about $11,000,000. The first New Jersey commission was named about nine years ago. At that same time a New York commission was named. After some discussion, it was found that New Jersey law would not permit appropria-

tions of more than $100,000 without a referendum, and other laws stood in the way of the project. In 1914 a law was passed at Trenton providing that, if Hudson, Passaic, and Essex Counties agreed, a bridge district could be created and appropriations made for the construction of bridges or tunnels to Manhattan. Hudson and Passaic agreed right away, but it was not until last month that Essex accepted the proposal. Governor Edge named a commission of leading men: Thomas W. Lamont of Englewood, a member of J. P. Morgan & Co.; Franklin Murphy of Newark, T. Albius Adams of Montclair, Morris Rachlin of Newark, Theodore Boettger of Hackensack, William H. Noyes of Tenafly, Albion H. Allen of Jersey City, Palmer Campbell of Hoboken, Colonel J. H. Wells of Jersey City, and Thomas N. McCarter of Rumson as member at large. Mr. McCarter is president of the Public Service Corporation of New Jersey which favors the project of a bridge or tunnel connection. The members of the New York Commission are George R. Dyer, E. W. Bloomingdale, McDougall Hawkes, Alexander J. Shamberg and bridge commissioner F. J. H. Kracke. A number of borings have been made and estimates obtained by the New York commission and interested New Jersey individuals.

It is said that the sentiment is now in favor of a tunnel or tunnels because of the great cost of a bridge The latest estimate made for the commission, about a year ago, put the cost of a bridge spanning the Hudson near Canal Street, at $42,000,000. Mr. Bloomingdale said the cost would probably be as high as $55,000,000 now because of the high cost of materials and labor.. He said that the proposition of more than the two tunnels or of bridges would be considered by the two commissions. which would begin joint sessions soon, and would probably make a report to the next Legislatures of New York and New Jersey. This means that the tunnels, regardless of interference by war conditions, would not be begun before some time in 1918. The commissions will also consider the interstate construction of tunnels for carrying railroad tracks. At the recent hearing of the application of New Jersey interests for a freight rate preferential over New York equal to the cost of ferryage across the Hudson great emphasis was laid upon the effect of the situation of the construction of freight tunnels leading from the terminals of railroads in New Jersey over to Manhattan. The congestion and inconvenience due to the lighterage, experts testified, would be greatly relieved by direct underwater rail connections. The appointment of the commission was made possible by Essex County joining with Bergen and Hudson, each appropriating $10,000 for preliminary expenses. The engineering investigation is already well under way through the activity of the Public Service Corporation. A special committee of the company, reporting recently to the executive committee, expressed the hope that publicity regarding its investigations would "result in the early construction of the tunnel as a free public highway."

Legislative Inaction Delays Chicago Transit Plans.

Chicago, Ill.—The comprehensive transportation plans worked out after a long study by the traction and subway commission are to remain in the plan stage for another two years at least because of failure to take action on the part of the house at Springfield. The four bills embodying the necessary enabling legislation had passed the senate with a good majority and had been reported to the house committee on public utilities and gone to third reading when the committee adjourned finally without a record vote on any of the measures. Then the assembly adjourned after an all-night session.

Duluth Compromises in Railway Controversy.

Duluth, Minn.—Action on the proposed condemnation proceedings by the city to assume operating management of the street railway system will be postponed following the agreement reached between the city and the Duluth Street Railway Company. The immediate construction of the extension from Morgan Park to New Duluth, a universal 5-cent fare at the end of the war or not later than Jan. 1, 1920, and universal transfers on all lines now constructed or to be built within the city limits are the three features of the compromise It was announced that the United States Steel corporation is now preparing the right-of-way for the Morgan Park-New Duluth extension at a cost of $146,000. The extension will be 2¾ miles in length and must be in operation by the end of the year. Under the terms of the compromise the company would continue to charge an extra fare west of Eighty-fifth avenue west going west and east of Forty-ninth avenue west going east on the Morgan Park-New Duluth line until the time in the agreement. The compromise followed conferences by the city commissioners and the president of the company. Commissioner of public utilities P. G. Phillips was the only one to vote against the agreement, insisting on immediate municipal ownership. Mayor Magney stated that the compromise would not eliminate ownership by the city, but merely postpone it. Litigation pending in the district court to test the validity of a 10-cent fare, now charged on the Morgan Park line, will not be affected by the compromise.

Tentative Plans for Cleveland's Rapid Transit.

Cleveland, O.—Following the presentation of a report by the sub-committee on subways and city plan engineers to the city plan commission, mayor Harry L. Davis is trying to hasten action on the formulation of a definite plan for improving transit conditions in the city. The report of the sub-committee follows: "Information relative to Cleveland's traffic problems was obtained from Robert Hoffman, city engineer; W. A. Stinchcomb, county engineer; judge Fielder Sanders, street railway commissioner; Ferdinand Eggers, M. F. Bramley, O. P. Van Sweringen, W. P. McMenimen and J. F. Collins of the Dock Contractor Company; J. S. Kearney, traffic expert; E. P. Goodrich, traffic expert, and Bion J. Arnold, traffic expert. After carefully considering the present conditions, the committee believes that there are five possible methods of solving the city's general traffic problems: 1, A subway system; 2, an elevated system; 3, purchasing private rights of way; 4, a central district subway system; 5, a combination of the street railway system with the steam railways, utilizing the rights of way of the latter.

1, A subway system—It is said that subways do not pay in cities of less than two million inhabitants. The complete subway system would be the most expensive method of solving the problem and the authorities consulted advised against the establishment of subways in Cleveland for many years to come.

2, An elevated system—This solution would be less expensive than a subway system and yet it would involve a large expenditure. While the committee believes that an elevated system could be built here that would be less objectionable than those in other American cities, nevertheless it agrees with the authorities consulted who claim that elevated roads are undesirable because they reduce property value, present an unsightly appearance, create noise, scatter dirt and keep light from streets and buildings.

3, Purchasing private right of way—This method would be very expensive and is a practical possibility only in the outskirts of the city.

4, A central district subway system—This would include a subway terminal station under the public square and short tubes running east and west and south. The cost has been estimated at from $5,000,000 to $12,000,000, depending upon the size of the system. This would mean interest charges of from $275,000 to $660,000 annually.

According to the traffic commissioner, such a system would effect a saving in operation not exceeding $100,000. Consequently there would be a considerable sum to be paid annually, either by tax payers or by those who would be most beneficially affected, namely, adjacent property owners and automobile owners.

If the latter method of raising money should be deemed advisable, laws would be required to make this distribution of the expense possible.

There are two ways of providing this central district subway system. One, by the city through a bond issue and the second by the street railway company. The general opinion of those consulted is that this system should be owned and operated by the city.

5, A combination of the street railway system with the steam railways, utilizing the rights of way of the latter—It is said that the railroad's road beds could be widened so that street car tracks could be built either in the center of or on either side of the steam road tracks. Cleveland is so situated along the shores of Lake Erie and has so many railways entering it from different directions that there would seem to be a possibility of utilizing these rights of way, widened in the suggested manner.

There is a possibility of utilizing and combining plans four and five. This possibility—which is only a possibility—seems to be better and more economical than either the subway or elevated system and is well worthy of careful study. In view of the above facts the committee recommends the elimination from consideration at the present time of a complete subway system, of an elevated system and of the pri-

vate right of way plan—except as a contingent possibility in the suburbs and further recommends concentrated attention upon the central district subway system combined with the steam railway right of way idea. The committee considers the traffic problem as an important part of the city plan, and so closely involved in the general city planning scheme that definite recommendations concerning the solution of the entire problem should not be made until some comprehensive program of all city planning features is undertaken. The committee believes that the east approach to the new high level bridge should be extended at this time as a subway to the public square and so constructed as to be readily adaptable to any general subway terminal plan of the future. The completion of this one portion of a general subway scheme would have the immediate result of eliminating from the surface all west side cars which constitute approximately 40 per cent of the entire street railway traffic. The committee believes that completion of this part of the subway could be done at the present time at much less expense than hereafter in view of the fact that excavation work for the bridge approaches is now being done. The committee, therefore, recommends: 1st. Immediate construction of a subway from the easterly terminus of the new high level bridge up Superior avenue to connect with a subway terminal to be constructed in the public square. 2d. That the city should at once proceed to determine a comprehensive and definite program for a central subway terminal and approaches. 3d. That the general study of the city planning, including subway development, be taken up immediately.

Street railway commissioner Fielder Sanders said he believed if the city tackled the joint problem of traffic congestion and rapid transit with regard to the growth and future development of Cleveland and not in a piece-meal way, the bond issue would have a much better chance with the elector and would also save the city much future disorganization and at least $1,000,000 in money. His plan is to have two loops in the northwest and southwest corners of the public square. Instead of having a single track corresponding to that on Ontario street, he would have four tracks.

That would give anywhere from two to four times the loading space we now have, Mr. Saunders explained. The advantage of this plan is that we could take care of at least twice as much traffic, the increase we could handle being largely dependent upon the radius of the loops. I would build very deep, so that we could have two floors. The first underground floor would be a mezzanine something like the Union depot, with a platform running over the tracks. This would enable us to separate the traffic and the passengers would not have to cross any tracks. Of course, it would be more expensive than a single station, but it fits into the general comprehensive scheme which must come before long. It would take care not only of the surface cars, but would also provide for a fast suburban service.

"My idea is to build for the future, and the plan I have outlined would take care of the city's needs for at least ten or fifteen years. The present scheme is to cost something like $2,000,000. Why not spend $3,500,000 on my plan and have something that will last for years? The $2,000,000 scheme is barely sufficient for present needs and the extra cost of adding to the excavation when we proceed with the larger project will be tremendously increased by the difficulties under which the work will have to be done in the future." The city charter provides for a rapid transit commission of five members to serve without compensation, whenever it is decided that such a commission is needed. This commission would have the power to lease any underground railway or other rapid transit line to the Cleveland Railway. Mayor Davis desires that the commission be appointed at once.

English Municipal Railway Increases Receipts.

Leeds, England.—The receipts of the Leeds municipal tramways for the year ended March 31, 1917, amounted to £515,805 ($2,510,165), compared with £475,505 ($2,314,045) for the year ended March 31, 1916, an increase of £40,300 ($196,119), or 8.47 per cent. This is the first time the receipts have amounted to £500,000, a result which is due to the increased number of passengers carried on existing routes—112,000,000, against 103,000,000 during the preceding year. The number of miles covered by the cars was 9,658,595, compared with 9,405,121 the preceding year. The profits for the year are estimated at £79,470 ($386,740), after £25,000 ($121,662) has been placed to the reserve fund.

MISCELLANEOUS

Men Who Will Build Cantonments.

Washington, D. C.—Actual construction work at each of the sixteen cantonments to be erected for the new National Army will be in charge of an officer of the Quartermaster Corps, either Regular or Reserve, to be known as the constructing quartermaster. Under him will be an assistant quartermaster. The constructing quartermaster will be in full charge at each cantonment, directing the laying out of the buildings and supervising for the Government the entire work of construction as carried on by the contractor. The personnel of the constructing quartermasters includes a number of well-known civilian engineers who have been given major's commissions in the Quartermaster Reserve Corps. In addition, several officers of the Regular Army Quartermasters' Corps are acting in executive capacity. Among the men appointed from civil life are: Maj. O'Kelly Williams Myers, an engineer of the New York water department, who will be in charge at Yaphank, L. I.; Maj. Ralph Fenne Proctor, chief engineer of a Baltimore bonding company, who has been assigned to the cantonment at Annapolis Junction, Md.; Maj. William Couper, an engineer for the Pennsylvania Railroad, who will be at Columbia, S. C.; Maj. James Norman Pease, principal assistant engineer of the Lockwood-Green Construction Co., of Columbus, Ga., who will be at the head of operations at Atlanta; Maj. Frank Elmer Lamphere, assistant engineer of the Baltimore & Ohio Co. at Chicago, assigned to Louisville, Ky.; Maj. Earle Bell Morden, a St. Paul railroad engineer, who will be at Battle Creek, Mich.; Maj. Donald Hubbard Sawyer, of Spokane, Wash., to be in charge at Rockford, Ill.; Maj. John R. Fordyce, a civil engineer of Little Rock, Ark., who will supervise the construction of the cantonment in that city; Maj. Millard Angle Butler, a St. Paul railroad engineer, to be in charge at Des Moines. Regular Army officers named as constructing quartermasters are: Capt. Edward Canfield, jr., Ayer, Mass.; Maj. Harry C. Williams, Wrightstown, N. J.; Capt. Frank B. Edwards, Petersburg, Va.; Capt. Ward Dabney, Chillicothe, Ohio; Capt. Frank J. Horman, Fort Riley, Kans.; Capt. George E. Thorne, Fort Sam Houston, Tex.; and Capt. David L. Stone, American Lake, Wash. The following officers have been named as assistant quartermasters: Capt. Graham Parker, Annapolis Junction; Capt. Thomas W. Holliday, Columbia, S. C.; Capt. Mark L. Ireland, Louisville; Capt. Manuel N. Garrett, Battle Creek; Capt. Owen G. Collins, Rockford; Capt. Joseph C. Kay, Des Moines.

Daylight Saving Adopted.

Springfield, Mass.—On July 1, the daylight saving plan officially went into effect in this city, clocks being set one hour ahead, according to an ordinance recently unanimously passed by the city council. Holyoke, Chicopee, West Springfield, Longmeadow, Agawam, Westfield and practically all cities and towns in the western part of the state will follow the lead set by Springfield, according to information obtained by the special investigating committee. Worcester and several other cities in the eastern part of the state have been considering similar action. The ordinance provides that the time of the 60th meridian of longitude west from Greenwich shall be the official time in this city for the transaction of city business. This is just one hour ahead of the existing time. This measure, it is understood, does not compel private interests to change their clocks, but it is believed that every manufacturing industry and business house will follow suit. City clerk E. A. Newell is of the opinion the new law will cause some conflict with state regulations. According to the state statutes his office must be kept open until 5 each day for the filing of mortgages and other business of like nature. Mr. Newell will at once obtain an opinion as to whether he will be required to observe the city or state time. Railroad time will remain the same, unless the plan should be adopted throughout the state, in which case it is understood that the transportation companies will alter their schedules to meet the new conditions.

NEWS OF THE SOCIETIES

Calendar of Meetings.

July 10-12.—MUNICIPAL LEAGUE OF INDIANA. Annual convention, Shelbyville, Ind. Secretary, W. S. Jones, City Clerk, Shelbyville.

July 12, 13.—LEAGUE OF MICHIGAN MUNICIPALITIES. Annual convention, Grand Rapids, Mich. Secretary, Charles A. Sink, Ann Arbor, Mich.

July 24-27.—DOMINION ASSOCIATION OF FIRE CHIEFS. Annual convention, Port Arthur and Fort William, Ont. Secretary, James Armstrong, Chief, Fire Department, Kingston, Ont.

July 30-Aug. 3.—SOUTHERN SOCIOLOGICAL CONGRESS. Annual meeting, Blue Ridge, N. C. Secretary, J. E. McCulloch, 508 McLachlen Bldg., Washington, D. C.

Aug. 1-3.—AMERICAN SOCIETY OF SANITARY ENGINEERING. Annual meeting, Grand Rapids, Mich. President, William C. Groeninger, Ohio State Board of Health, Columbus, O.

Aug. 6.—PACIFIC COAST ASSOCIATION OF FIRE CHIEFS. Twenty-fifth convention, Anaconda, Mont. Secretary, ex-Chief H. W. Bringhurst, Seattle, Wash.

Aug. 15-17.—LEAGUE OF WISCONSIN MUNICIPALITIES. Annual convention, Racine, Wis. Secretary, Ford H. MacGregor, Madison, Wis.

Aug. 21-23.—NEW YORK STATE FIREMEN'S CONVENTION, Flushing, N. Y. Secretary, Thos. Honohan, Frankfort, N. Y.

Aug. 22.—UNION OF NEW BRUNSWICK MUNICIPALITIES. Annual convention, St. John, N. B. Secretary, James King Kelley, St. John.

Aug. 27-29.—UNION OF CANADIAN MUNICIPALITIES. Annual convention, London, Ont. Secretary, W. D. Lighthall, K.C., Westmount, Que.

Sept. 5-8.—LEAGUE OF AMERICAN MUNICIPALITIES. Annual convention, Gary, Ind. Secretary, Robert E. Lee, City Hall, Baltimore, Md.

Sept. 11-13.—AMERICAN ASSOCIATION OF PARK SUPERINTENDENTS. Annual convention, St. Louis, Mo. Secretary, Roland W. Cotterill, 533 City Hall, Seattle, Wash.

Sept. 11-14.—NEW ENGLAND WATERWORKS ASSOCIATION. Annual convention, Hartford, Conn. Secretary, Willard Kent, 715 Tremont Temple, Boston, Mass.

Sept. 18-20.—LEAGUE OF VIRGINIA MUNICIPALITIES. Annual convention, Lynchburg, Va. Secretary, L. C. Brinson, Portsmouth, Va.

Sept. 24-29.—LEAGUE OF CALIFORNIA MUNICIPALITIES. Annual convention, Santa Rosa, Cal. Secretary, Wm. J. Locke, Pacific Building, San Francisco, Cal.

Sept. 27-29.—AMERICAN AND CANADIAN ENGINEERS AND ARCHITECTS OF NORWEGIAN BIRTH OR DESCENT. Informal congress and re-union, Chicago Norske Klub, Chicago, Ill. Chairman, Committee on Arrangements, Joachim G. Glaver, consulting engineer, Chicago, Ill.

Oct. 15-17.—NATIONAL HOUSING ASSOCIATION. Annual conference, Hotel La Salle, Chicago, Ill. Secretary, Lawrence Veiller, 105 East 22d St., New York City.

Oct. 17-18.—LEAGUE OF MINNESOTA MUNICIPALITIES. Fifth annual convention, St. Cloud, Minn. Secretary-treasurer, Richard R. Price, University of Minnesota, Minneapolis.

Nov. 21-24.—NATIONAL MUNICIPAL LEAGUE. Twenty-third annual meeting, Hotel Statler, Detroit, Mich. Secretary, Clinton Rogers Woodruff, 703 North American Bldg., Philadelphia, Pa.

Nov. 20-23.—PLAYGROUND AND RECREATION ASSOCIATION OF AMERICA. Recreation Congress, Milwaukee, Wis. Secretary, H. S. Braucher, 1 Madison Ave., New York, N. Y.

National Conference of Social Work.

The forty-fourth annual meeting of this conference, formerly the National Conference of Charities and Correction, was held at Pittsburgh, Pa., June 6-13. New officers were elected as follows:

President, Robert A. Woods, Boston; vice-presidents, John A. Kingsbury, New York, Judge William A. Way, Pittsburgh, Florence Kelley, New York; members of the executive committee, Roy Smith Wallace, Mrs. W. L. Murdoch, Rev. Frederick Seidenberg, Ida M. Cannon, Otto W. Davis and Marcus C. Fagg.

Chairmen of divisions were appointed as follows: Children, Henry W. Thurston; Delinquents and Correction, Jessie A. Hodder; Health, Dr. J. H. Landis; Public Agencies and Institutions, Albert Sidney Johnstone; The Family, Gertrude Vaile; Industrial and Economic Problems, Florence Kelley; The Local Community, Charles C. Cooper; Mental Hygiene, Dr. William Healy; Organization of Social Forces, Allen T. Burns; Social Problems of the War and Reconstruction, V. Everitt Macy.

A plan was discussed to ally more closely to the conference kindred organizations. Action on the plan was taken as follows: Five will remain completely independent, including the American Association of Societies for Organizing Charity, National Conference of Jewish Charities and National Conference of Jewish Social Workers; nine will retain independent existence but will unite their programs with the National Conference—among these are National Conference on Urban Conditions Among Negroes, National Housing Association, International Association of Policewomen and American Social Hygiene Association; eight will become integral parts of the National Conference—Teachers of Practical Sociology, Industrial Social Service Group, Group on Charities Endorsement, Charities Federation and Central Councils of Social Agencies, Officials of Charities and Corrections, Presidents and Secretaries of State Conferences, Land Taxation Group and Special Committees on Radical Social Movements.

League of Texas Municipalities.

Organization of the Texas Council of Public Health Agencies, the election of officers for the ensuing year, discussion and consideration of public health work now in progress, the reading of reports of various committees and discussion of the subject, "Sewerage and Sanitation," occupied the final session of the League of Texas Municipalities which was held at Dallas, June 20-22.

Officers elected for the following year are: Mayor W. H. Knight, Hillsboro, president; Mayor J. H. Painter, Crockett, first vice-president; C. I. McFarlane, Richmond, second vice-president; E. L. Wells, city manager of San Angelo, third vice-president. Dr. W. B. Collins, State Health Officer, was elected an honorary member of the league.

Fifteen unofficial health agencies were represented at the organization meeting of the Texas Council of Public Health Agencies, almost all of which have headquarters in widely varying points in Texas. Among the most prominent of the organizations were the Dallas Federation of Women's Clubs, the Dallas Association for the Study and Prevention of Tuberculosis and the Texas Public Health Association. A constitution and by-laws were adopted. James A. Rawlings of Fort Worth was elected president, and D. E. Breed, executive secretary of the Texas Public Health Association, of Austin, was elected secretary of the new organization.

The meeting was called to order by Dr. W. B. Collins, State Health Officer, who urged the co-ordination of the interests of the public health agencies into one organization, primarily for the prevention of duplication of efforts.

Galveston, Clifton, Waco and Midland have been offered as convention cities for 1918. The final choice will be made by the executive committee, and all cities desirous of obtaining the convention are entitled to make application to the secretary, accompanied by reasons why the convention should be awarded them.

Prof. Herman G. James of the University of Texas presented the secretary-treasurer's report for the year, the fiscal end of which is in November. During the fiscal year, beginning November 1, 1916, nine new active members have been added to the league, as follows: Athens, Clifton, Crockett, San Angelo, Sinton, Texarkana, Texas City, Mart and Honey Grove. Forty-three new associate members have been added also during this period. The league now has fifty-two active members and forty-four associate members. The report showed that the secretary's office, in connection with the University of Texas bureau of municipal research and reference, has supplied many hundreds of people with information regarding municipal affairs, and has furnished many local addresses on municipal topics. It was suggested that students of the University who specialize in municipal work be employed by Mayors and officials of Texas towns, both for the benefit of the towns and the students.

Dr. H. H. Smiley of the Cotton Belt Railroad explained the anti-malaria campaign being conducted by that company along its lines. He cited the work being done to prevent disease among stock and cattle and said that modern society is more careless with its human beings than it is with its animals. Malaria is one of the worst scourges or plagues existing, although

it is not spectacular, he said. Since the campaign was inaugurated the cities and towns traversed by the Cotton Belt lines have gradually come to appreciate the value of the anti-malaria work and have extended unstinted co-operation to the railroad and Government officials engaged therein. Tyler, which has been ditched for draining purposes, has been given its initial cleaning and men have been appointed to maintain the work thus far done. Work is now being done at Lufkin on the same scale. Many lectures on health and sanitation subjects have been given and many moving pictures and stereopticon pictures have been shown to illustrate the value of the work. The railroad is anxious to further promote the work and asks the co-operation of all cities, towns and individuals affected by malaria along its lines, Dr. Smiley said.

Dr. P. W. Covington, director of the bureau of rural sanitation of the State Health Department, who recently met with the Dallas County Commissioners' Court regarding a health survey of this county, which was decided upon, outlined the procedure which would be followed in the campaign. The force to which this work will be intrusted will consist of a trained physician as field director, one technical clerical assistant, one health inspector and laboratory worker and four assistants to carry out the details assigned to them. The county is only required to compensate the four assistants, the State and the International Health Board bearing the remainder of the expense, he said. Any county which will appropriate $200 a month for employment of the four assistants may have a health survey made within its confines. Full details of how the work will be carried through were given by Dr. Covington.

Dallas County has a rural population of approximately 30,000, with an average of 540 deaths each year, 200 of which are preventable. The fact that this number of deaths is preventable creates an obligation upon society to prevent them, and the County Commissioners' Court realized this fact when it appropriated the health survey, Dr. Covington said.

An enumeration in part of the achievements of the Dallas Public Health Department for the last year was given by H. W. Van Hovenberg. Some of the accomplishments given follow: Organizations of the anti-tuberculosis society, a survey of part of the territory occupied by negroes in Dallas during negro health week, the extension of anti-malarial work to Bachman's Dam for the purpose of diminishing infection of the many campers who go there, the promotion of vaccination for smallpox among the employes of large Dallas concerns, the installation of an expert dietician at the City Hospital, the employment of a full-time physician for the Emergency Hospital, the passage of common towel and drinking cup ordinances, the scoring of restaurants and public eating and drinking places, the sanitary supervision of the State Fair, the examination of public bathing places, report on the design for the sewage plant recently placed in operation, the health department was instrumental in obtaining the construction of an incinerator, and the scoring of dairies, for which information thousands of inquiries have been received by the department officials

In substitution for Dr. Witte, Mayor Knight of Hillsboro gave a brief report on the health survey work being done in Hill County, which, he said, includes the inspection of every home in the county and the dissemination of much valuable publicity matter regarding preventable diseases. The slogan

(*Continued on page* 20)

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

St. James, Minn., is improving its WATERWORKS. The engineer for the work is J. G. Robertson, 2542 University avenue, St. Paul.

SEWERS are being constructed by Oakmont, Pa., plans and specifications having been prepared by Douglass & McKnight, 1315 Union Bank building, Pittsburgh, Pa.

Skagit County, Mt. Vernon, Wash., is rebuilding a BRIDGE. The engineers are Bowermen & McCloy, Mutual Life building, Seattle, Wash.

Improvements are to be made to the WATERWORKS of Weston, Ont., according to plans and specifications being prepared by James, Loudon and Herzberg, Toronto, Ont.

A BRIDGE is to be constructed by the City of Maine, Fla. The plans and specifications for the structure have been prepared by Harrington, Howard & Ash, Orear-Leslie building, Kansas City, Mo.

WATERWORKS and an ELECTRIC LIGHT PLANT to cost $35,000 are proposed for Wilson, Okla. The Benham Engineering Company, Colcord building, Oklahoma City, Okla., has been retained in a consulting engineering capacity.

The Savanna & York Drainage district, Savannah, Ill., is building a PUMPING STATION. Plans and specifications for the work have been prepared by the Edmund T. Perkins Engineering Co., First National Bank building, Chicago, Ill.

McConnellsville, O., is making SEWER improvements. The engineer who prepared plans and specifications for the work is F. B. Pinley, Malta, O.

Morton Grove, Ill., in making STREET IMPROVEMENTS, followed plans and specifications prepared by Edgar & Rossiter, 82 W. Washington street, Chicago, Ill.

A SEWERAGE SYSTEM is to be built by Grand Meadow, Minn. The engineers are Rose & Harris, 471 Auditorium building, Minneapolis, Minn.

Westfield, N. Y., is to construct WATERWORKS to cost $80,000. The engineers are Gannett, Seelye & Fleming, 204 Locust street, Harrisburg, Pa.

A SEWERAGE SYSTEM and SEWAGE DISPOSAL PLANT are to be built by Spirit Lake, Ia., plans having been completed by the engineer, C. H. Currie, Webster City, Ia.

The Chamber of Commerce, Reading, Pa., is studying the problem of GRADE CROSSING ELIMINATION. The chamber has engaged H. H. Althouse, Woolworth building, New York, N. Y., as consulting engineer to make a report.

Horse Heaven Irrigation District has voted $18,000,000 to complete its IRRIGATION SYSTEM. The engineers for the big project are R. H. Thomson, Alaska building, Seattle, Wash., O. Laurgaard, Railway Exchange building, Portland, Ore., and A. J. Wiley, Butte, Mont.

PERSONALS

Barbour, C. D., has been appointed chief of police of Raleigh, N. C.

Brown, Chas. C., for more than 20 years editor of "Municipal Engineering," severed his connection with that periodical beginning with the June issue.

Carnes, Dr. A. W., has been appointed city health officer of Dallas, Tex.

Grady, J. William, manager of the traffic bureau of the Syracuse Chamber of Commerce, has been appointed traffic manager of the New York state barge canal.

Hartwell, D. A., for many years city engineer of Fitchburg, Mass., and later engineer for the new sewer systems, has retired from the city service.

Lee, Ben, has been elected city engineer of Hutchinson, Kans., succeeding G. L. McLane, who has resigned to act as captain of Co. A, Engineer Corps, Kansas National Guard.

Maddock, Thomas, has been appointed state engineer of Arizona, succeeding Lamar Cobb, resigned.

Olmsted, H. B., has been appointed superintendent of highways and bridges for town of Darien, Conn.

Rights, Will, has been made assistant engineer of the Indiana State Highway Department.

Winslow, Prof. A. D., of Norwich University, has been made city engineer of Montpelier, Vt.

Woods, James Whitfield, vice-president and treasurer of Tippett & Wood, Phillipsburg, N. J., died recently.

INDUSTRIAL NEWS

Cast Iron Pipe.—Prices remain at the high level of last week, following the sensational increase of $5 a ton. Quotations: Chicago—4-inch, class B and heavier, $68.50; 6-inch, $65.50. New York—4-inch, class B and heavier, $68.50; 6-inch, $65.50. Birmingham—4-inch, class B and heavier, $63; 6-inch, $60, class A, $1 extra.

The Medora Shale Brick Company, Medora, Ind., of which Mr. N. V. Trautman is president, has joined the family of licensees of The Dunn Wire-Cut Lug Brick Company, Conneaut, Ohio. The addition of the Medora company gives the Dunn company 46 licensees, operating 71 plants in 12 states.

National Concrete Pavement.

The Bituminized Road Co. has just secured patents for a new pavement which it calls "National Concrete," which consists of the material that is called "National" pavement, mixed with broken stone. The National pavement is a mixture of about 75% dust and 25% asphaltic cement; and about 33 1/3% of this mixture, by weight, is mixed with 66 2/3% of broken stone. By volume, the final mixture contains approximately 42% of the bituminous earth mixture, more than enough to fill the voids in the stone. The stones do not touch each other and are not relied upon for stability, and there is no effort to secure any special grading of coarse aggregate to reduce voids to a minimum; but the chief object of the stone is to reduce the cost, the pavement containing only 8 1/3% of asphaltic cement, by weight, or 16 2/3 lbs. per square yard 2 inches thick. No sand is used. In one method of manufacture, gravel or broken stone together with any associated dirt is run through a pulverizer, the dust resulting is mixed with the asphalt, and the larger particles that come through the pulverizer uncrushed are used as the coarse aggregate.

The Walter A. Zelnicker Supply Co., St. Louis, Mo., announces that it has secured the services of Mr. W. H. Dayton, as city salesman. Mr. Dayton was formerly with the Railroad Supply Co., Chicago, Illinois, as secretary and purchasing agent; also the eastern representative for five years. He came to Saint Louis seven years ago representing the same firm and that of the Chicago Signal & Supply Co., and the Elyria Iron & Steel Co., manufacturers of signal and track maintenance materials.

The Barrett Company has just issued four new booklets on "Tarvia" and its uses in road and pavement construction. This new literature covers "Tarvia X," used for binder purposes; "Tarvia-A," for hot surface-treatments, and "Tarvia-B" for cold surface treatments. The materials are fully described and the methods of their use on various types of pavements are clearly specified in detail. All the points brought out are illustrated with "before-and-after" pictures of fine pavements in all parts of the country and by very interesting photographs taken on the job. One of the booklets deals especially with "How a Tarvia Macadam Roadway Is Constructed," and each step in the work is thoroughly explained and illustrated, the unusual method being used of devoting a page to each step, with an illustrative photograph on the opposite page. The accompanying cuts show an example of the interesting and useful material to be found in the booklets and illustrate "Penetration Methods of Applying and Handling Tarvia-X."

The Blaw Steel Construction Co., Pittsburgh, and the **Knox Pressed & Welded Steel Co.,** Wheatland, Pa., has been merged July 1 as the Blaw Knox Co., a change of name under the charter of the present Blaw Steel Construction Co. The authorized capitalization will be $2,000,000. The plant of the Blaw Steel Construction Co. manufactures steel forms for concrete work, steel transmission towers, clam shell buckets, and general structural steel fabrication. The plant of the present Knox Pressed & Welded Steel Co. manufactures water cooling devices for open-hearth furnaces, and also heavy hydraulic pressed steel plate work. The general sales offices of the company will be in Pittsburgh, with branch offices, as they now exist, in New York, Chicago, Boston and San Francisco, with general executive offices at Hoboken, Pa. The present officers of the Blaw Steel Construction Co. retain their present titles in The Blaw-Knox Co., and the board of the present Blaw Steel Construction Co. will be increased to include five of the directors of the Knox Pressed & Welded Steel Co.

Bids on 35,000 Army Trucks.

The War Department's request for bids for 35,000 army motor trucks brought response from eighty-seven concerns, and when the offers were opened it was found that the number for which bidders were ready to contract was many times the Government's requirements. How many will be ordered has not been determined. The estimate of 35,000 made in asking for bids was based on the maximum

Filling auto-truck from storage-tank.

Spraying "Tarvia-X" under pressure.

Spreading Tarvia with hand-pouring pot.

Spraying with pressure-nozzle.

Storage tanks for Tarvia.

PENETRATION METHODS OF APPLYING AND HANDLING "TARVIA-X."

transport needs of an army of 2,000,000 men.

Practically all the big motor companies and many of the smaller concerns submitted bids. Many types and sizes were offered, the prices ranging from $1,031 for one-ton trucks to $4,600 for five-ton vehicles. Some of the manufacturers are ready to begin delivery at once and others set varying delivery rates, ranging up to six months in the future. Three concerns —the Pierce-Arrow Motor Car Company, the Hurlburt Motor Truck Company, and the Nash Motors Company —each offered to build the whole 35,000. Three companies offered to build trucks at cost plus 10 per cent. profit. Offers to turn out ten trucks a day comes from two firms with no limit set on the total. It is estimated that there are not more than 40,000 motor trucks on the Allies western battle front in Europe, that number having proved ample for the needs of the British, French and Belgian fighting forces. For this reason some officials feel that the War Department should not go above its estimate of 35,000 as the total to be ordered. It is expected that those offering quickest deliveries will receive preference in the placing of contracts.

A Motor Truck Railroad.—While motor trucks up to this time have operated only in the "short haul field," as "feeders" to the railroads, the **Goodyear Tire & Rubber Company,** Akron, O., has for some time prophesied the establishment of motor transportation lines not confined to short hauls of 25 to 75 miles, but covering routes of hundreds of miles. In fact, not only has the operation of lines maintaining regular schedules, night and day, between cities, been visualized, but has actually been transformed into reality.

Now in the present rail congestion, the Goodyear Company has inaugurated this new era in the transportation world through the establishment of a line operating between its factory at Akron, O., and Boston, Mass., hauling tires to its eastern branches, and returning laden with cotton fabric from the Goodyear Cotton Mills, at Goodyear, Conn., a trip of 1,540 miles. Three round trips have already been made, the last of which was accomplished in seven and one-half days. The truck used on these pioneer trips is a 5-ton Packard of standard motor and chassis, fitted with a special body. Behind the driver's seat is a special sleeping compartment, the width of the truck cab, containing a bunk, used by the two truck drivers in relays. It might be supposed that sleeping on a motor truck would be somewhat difficult, but the cushioning qualities of the 38 x 7 front, and 44 x 10 rear pneumatic cord tires, with which the wheels are fitted, renders the sleeping quarters quite comfortable. The load carrying portion of the truck is of stake body, covered with a large tarpaulin bearing a large sign reading "Akron—Boston Express." A 44 x 10 tire carried on the end gate serves both as a spare and an exhibition tire. The tires used are of the same construction as other Goodyear Cord tires, except that they carry a large number of plies of cords and much additional rubber. They carry a five-ton load with no more damage to the road than that caused by an ordinary touring car. The tire is sufficiently large to cushion the load, absorbing all shocks and distributing the weight over a greatly increased section of it. With the use of these big tires, allowing transportation of heavy loads without damage to the road surface, the opposition to the operation of truck transportation lines, which has been aroused by the pounding and pulverizing action of many solid-tired heavy-duty trucks on the foundations of the roads, will be withdrawn, for it is not the heaviness of the load that breaks up the road surface, but the jolting and pounding and intense vibration caused by lack of proper cushioning. Now that the Goodyear Company has apparently proven that long hauls by motor trucks can be successfully accomplished, it is expected that many other long distance routes will be established by other concerns.

NEWS OF THE SOCIETIES

(*Continued from page* 18)

of the county is "100 per cent sanitation," he said. At first the survey moved slowly because the people were not awake to its importance, but since they have become aware of its value full co-operation has been extended.

The afternoon session was opened with a report by the committee on sewage and sanitation, made by Chairman J. H.Painter, Mayor of Crockett. The report showed that more than $3,000,000 had been spent dring the last year for the installation of sewage systems in cities and towns in Texas. It was reported that some cities in Texas have taken no steps in compliance with the State anti-pollution act, due largely to the inability of city officials to finance the work. Many cities, because of the cost of sewage disposal systems required by the State under the anti-pollution act, have permitted their interest in other essential public health activities to relax, the report said. Some discussion was evoked as to the advantages of the bucket system of dry closets, and also regarding the means and cost of disposing of waste under this system.

"Next Needs in Stream Protection in Texas" was the subject of an address by V. M. Ehlers, State Sanitary Engineer. Mr. Ehlers gave an account of work being done by the State Sanitary Department in co-operation with army officials in constructing sanitary conditions for the army camps to be located in Texas. A sewage disposal plant is being constructed at Leon Springs, to cost more per capita of users than any system in Texas, he said. Improper disposal of human waste results in 75 per cent of all human illness, and the final success of the war will rest largely on the improvement of sanitary conditions and the raising of human efficiency with sanitation, he said.

Stream pollution in Texas has not yet been obviated, Mr. Ehlers said, basing his statement on the many complaints received from farmers that their cattle are drying from drinking water in certain rivers, and from others that they can not irrigate because of the polluted water in several Texas rivers. Fish have been reported dying in schools in some of the streams, mainly among which are the Colorado, Trinity, West Fork and two West Texas rivers. Many towns lack funds with which to comply with the law. Two years ago the sanitary department was afraid to institute suits against these cities, but this action will be taken soon, with every confidence of successful verdicts, Mr. Ehlers said. Now that many cities have new sewage disposal plants, they should be maintained in good condition. The State will hold all cities responsible for the effective operation of their plants and the standard of effluent must be maintained.

League of Pennsylvania Third Class Cities.

The annual convention of the League of Cities of the Third Class in Pennsylvania, to be held in Hazleton, will be on August 28, 29 and 30.

A number of matters held over from last year's convention will be up again at the coming convention. The resolution of Mr. Hahn, of McKeesport, that an effort be made to have the Legislature pass a bill permitting the use of terra-cotta pipe in plumbing in third class cities will be voted upon. Johnstown's taxation bill will probably be brought up again.

Indiana Electric Light Association.

"War Times and the Central Station Business" was the topic on which F. S. Hunting, general manager Fort Wayne (Ind.) works of the General Electric Company, addressed commercial men of the Indiana Electric Light Association at Fort Wayne on June 20.

Thomas Donahue, of Lafayette, presented a paper entitled "Organization of New-Business Departments," which was discussed by S. T. Sharp, Evansville; C. B. Young, Rochester; Samuel Mott, Noblesville, and P. C. Pfenning, Indianapolis.

The paper on "Increasing Load Factor of Existing Lines," by N. A. Perry, of Indianapolis, was discussed by M. S. Caldwell, South Bend; E. S. Goodrich, Winchester; C. M. Poor, Clinton, and C. A. Nash, Lafayette.

Discussion of a paper on "Development of the Sale of Socket Appliances," by Milton Hennoch, East Pittsburgn, Pa., was led by H. C. Goldbrick, Chicago; W. H. Crawford, Hammond, and M. V. Stagg, Fort Wayne.

The association will probably hold a one-day convention in July instead of the usual three-day session in September.

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BUILDING THE ARMY CANTONMENTS

How the Sites Were Selected—Laying Out the Building Locations—Purchasing and Transporting Materials—Supervising the Work—Precautions Against Fire—Water Supply and Sewerage—Building Plans.

Although in few if any cases have the plans for the new army cantonments yet been completed, work upon them has already made considerable progress, the design and construction proceeding side by side because of the demand for their earliest possible completion. This would be impossible were it not that the construction in every case is being contracted for on the cost-plus-percentage basis; and so long as the contractor receives plans far enough in advance to order his materials and keep his men busy, he is not hampered and the work does not need to wait for the planning of future details.

The general planning for the cantonments consists in preparing designs for each of the several classes of buildings which will be required, these being standardized for all the cantonments and for given units of men. For instance, there is a standard barrack for a company of 123 men, and those built in the American Lake cantonment in Washington will follow the same plans as those now under way at Ayer, Mass. The same is true of the other buildings required. The differences in details will largely be due to those imposed by topography, and to a certain extent by climate, by the different facilities and necessities connected with the obtaining of water supply, the disposing of sewage, etc., the location of railroad sidings, rivers, main highways, etc.

THE SITE.

The camps were located originally by department commanders, whose recommendations were reviewed by the general staff, the latter reporting its decisions to Secretary Baker for final approval. While the sites were being chosen, Col. Littell's staff was designing a typical cantonment for each of the 16 divisions, planning the buildings, estimating the general sewerage and water requirements and doing everything that could be done before a map was available. As soon as a site was selected, a topographic survey was made of it, and data concerning possible sources of water supply and facilities for sewage disposal, railways and highways in the vicinity, etc., were obtained. As soon as this information had been mapped, the general layout of the camp was made and the contractor for each cantonment was given the information necessary to begin his preliminary work.

In choosing the site it has been considered desirable to have open and fairly level land for drilling, but this has in some cases been reduced to a minimum where the providing of it would entail large additional cost. In most cases the cost will probably be reduced by having the troops themselves do some of the clearing of land not required for the construction work.

Many of the cantonments have been located upon a porous soil, as this considerably simplifies the very important necessity of preventing the ponding of water on the area, without requiring any great amount of grading. One of the cantonments in the vicinity of New York, for instance, is on the sandy soil of the south shore of Long Island. Another is in New Jersey, in Burlington Co., where the soil is a sandy loam and the land slopes uniformly toward the Delaware river. In each of these locations there is an abundance of ground water which can be used for the water supply.

In laying out the buildings of each cantonment, brigade formations have been preserved so far as possible, and in no case have the buildings for one of the primary units been interposed among those of another primary unit. The buildings for the animals are generally separated from those for the men by the main trucking road. In all cases special attention has been given to provide fire breaks, usually by constructing wide roads, but in some cases by open spaces between buildings.

The construction within two or three months of a city for housing 40,000 men involves very serious problems of transportation of material, and the first work after the selection of a cantonment site was the construction of roads and railway sidings, absolutely necessary for carrying out the building program. While these are under construction, sufficient material and men are brought to the site for providing quarters for the laborers, numbering several thousand in each case. The first of the cantonment buildings to be constructed are therefore the barracks, including the kitchen and mess facilities, lavatories, officers' quarters and store houses and whatever works are necessary for water supply and sewerage. By the time buildings have been completed for housing the laborers, it is probable that the railway sidings and highway improvements necessary for transporting the lumber at the rate of millions of feet a day, and the other materials in similarly large quantities, will have been completed.

PURCHASING AND TRANSPORTING MATERIALS.

Before letting the contracts, the lumber sub-committee of the General Munitions Board interviewed representatives of the big lumber associations of the country and agreed with them upon a price for lumber for the cantonments, not to exceed an average of $20 per thousand. Independent mills can also furnish lumber for the cantonments, but the contractor is required to place at least 75 per cent of his lumber bill with the lumber sub-committee, that they may arrange with the lumber association for that amount of material. This committee has districted the United States and selected the

mills so located, from the point of view both of railroad facilities and of time of delivery, as to be best fitted for supplying the lumber to each cantonment. This arrangement will prevent contractors from bidding against each other and thus raising the price of lumber.

Other sub-committees have furnished Colonel Littell with statements of building materials that can be furnished by each dealer in the territory where each camp is located, and the prices of such materials and rates of delivery which can be secured. These data are furnished to the constructing quartermaster of each camp for the guidance of the contractor. The latter is expected, however, to buy in the local markets the small tools, minor equipment and materials needed, and the constructing quartermaster is ordered to give the contractor at all times "every assistance calculated to expedite his work and relieve him from hampering restrictions of any sort."

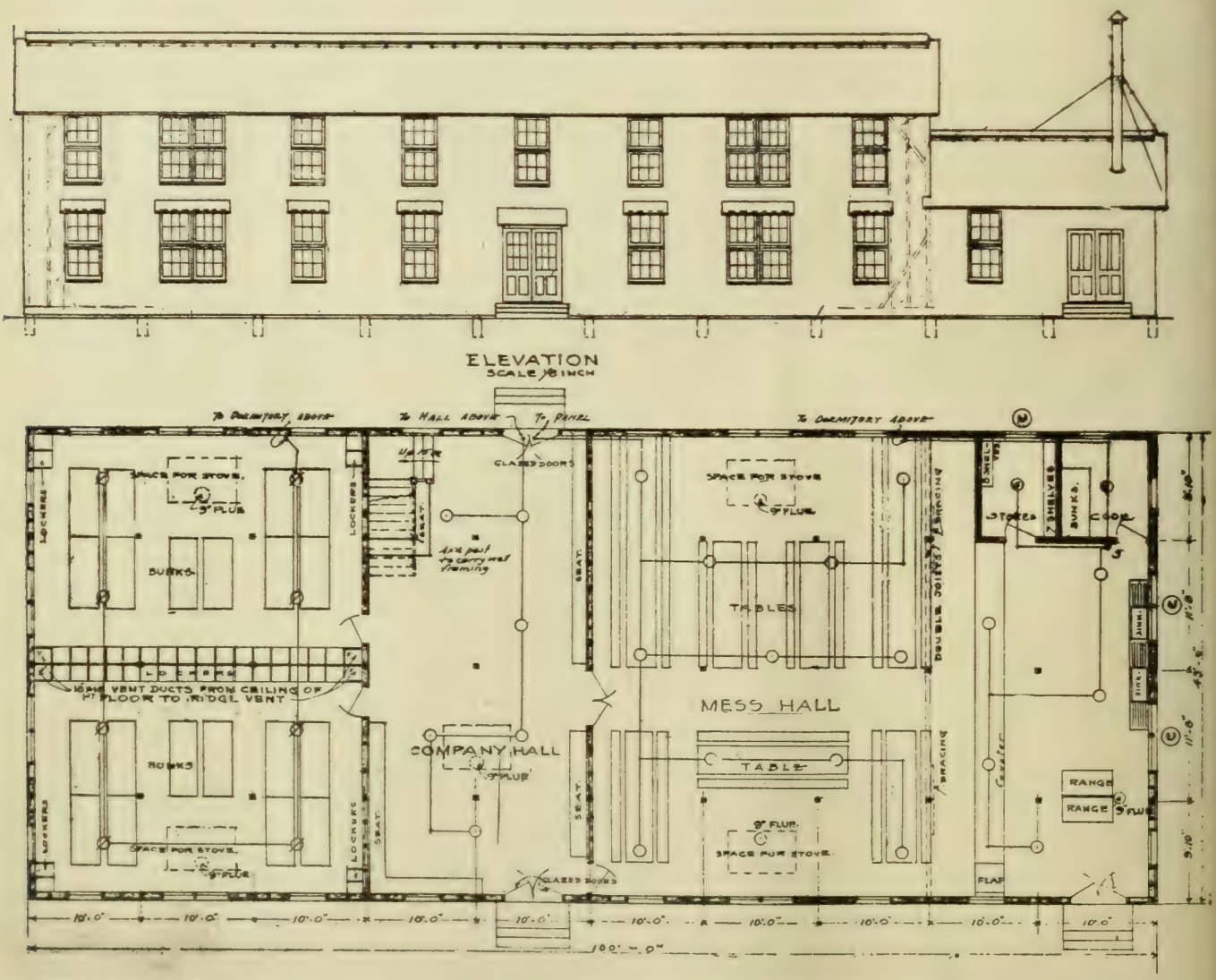
The transportation of materials is largely in control of the Commission on Car Service of the American Railway Association. The contractor furnishes certificates of the number and classes of cars needed to transport the materials for the camp, the points of shipment and the distance, and the approximate dates on which the cars are required. The Government furnishes a way bill envelope for each car, which will indicate to every yardmaster and trainman that the car is engaged in national service and must be moved without interruption. A representative of the railway on which the camp is located is stationed at the camp to expedite deliveries. If a shipper cannot secure cars for deliveries, Colonel Littell has authority to issue an order to the railway originating the business to supply the necessary cars.

SUPERVISION OF WORK.

The union scale of wages prevailing at the locality of the cantonment on June 1, 1917, is to prevail for that camp. The regulation of hours of work and overtime pay is fixed by agreement between the constructing quartermaster and the contractor, in accordance with conditions prevailing in that section.

From the beginning, the constructing quartermaster has an auditor on hand with an accounting staff, in order that the government may have complete knowledge of all items of cost involved in the payment on the contract.

In some cases the constructing quartermaster is a member of the Quartermaster's Corps, but others are members of the Officers' Reserve Corps who have won recognition as construction superintendents of the first rank; and each of the latter is relieved of military and administrative work for which his civilian experience did not train him by the presence of an officer of the regular army, who looks after the same. The constructing quartermaster has very large powers, being given



COMPANY BARRACK—PLAN OF FIRST FLOOR AND FRONT ELEVATION.

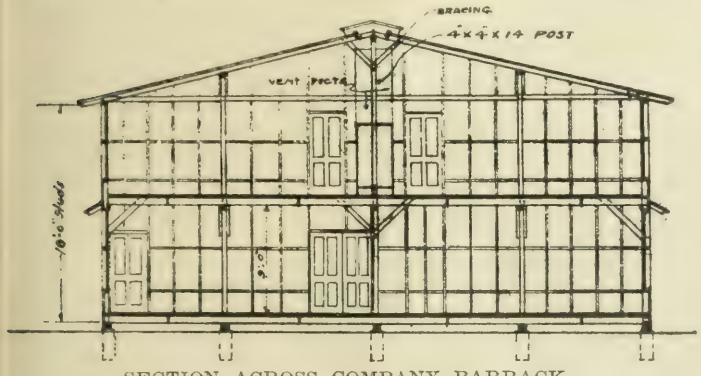
practically complete authority except as to the general instructions issued by Colonel Littell, in order that the speed of the work may be in nowise hampered.

A daily telegraphic report to Washington is to be made on each of the principal features of the work, and a regular weekly report will give a comprehensive view of conditions, weekly graphic charts showing the progress in the delivery of materials and in the construction of each class of structure.

PRECAUTIONS AGAINST FIRE.

Most of the cantonments will be located on land which must be cleared of trees and underbrush which, during the hot summer weather, would soon become quite inflammable; and, in addition, the entire construction will be of lumber, vast piles of which will probably be always present on the site. Consequently the fire risk will be considerable. It is required therefore that all brush, rubbish and dry grass be burned where building materials are to be stored, and for a distance of 300 feet around all storage yards and building sites. As soon as materials arrive, water casks and pails are placed where they will be convenient for use in extinguishing incipient fires and a continuous fire patrol is established. As soon as fire apparatus is received, fire companies are organized.

Smoking is prohibited wherever building construction is carried on or material is stored. Certain areas are designated where workmen may smoke at noon and smoking is permitted in a few buildings, where constant watch is maintained.



SECTION ACROSS COMPANY BARRACK.

Open fires on or near building sites are prohibited. All rubbish about buildings is collected daily and removed to a place where it can be burned safely. No open-flame lights, including candles, may be used in buildings, and to aid in enforcing this regulation the kits of plumbers, steam fitters and other mechanics are inspected before they are permitted on the job. Gasoline furnaces and torches must be kept in tool boxes or shanties outside buildings, and not more than three 5-gallon cans of gasoline are permitted on the job at a time. The use of charcoal for heating soldering pots is prohibited. No tar kettles or lead furnaces heated by wood fires may be placed within 50 feet of a building or lumber.

Boilers and internal combustion engines must be placed in detached iron-clad buildings. Boilers must not be set on wooden frames or platforms, and stacks into which engines exhaust must have screened tops. Power-driven woodworking machines must not be operated in buildings under construction or in sheds within 20 feet of such buildings. All electric wiring, even for temporary use, must conform to the national electric code.

WATER SUPPLY.

The minimum water supply for a cantonment has been fixed at 55 gallons per capita daily, equivalent to from 2,000,000 to 2,500,000 gallons per day for camps of 36,000 to 45,000 men. These quantities include the water required for animals and miscellaneous uses. Four pumping units are provided for, the smallest having a capacity of 750 to 1,000 gallons per minute. The capacity is required to be such that on three minutes' notice water can be furnished for one hour at 2.85 times the minimum rate.

The distribution system is designed for pressures of from 60 to 85 pounds. Within the camps, machine-wound wood stave pipe is to be used for most of the distribution system, about 50 tons of cast iron pipe for curves and other special requirements and another 50 tons of specials being used, and cast iron pipe being used to bring the water from a distance to certain of the camps, as the one at Columbia, S. C., where the government will use 4,500 feet of 16-inch cast iron pipe and the city will lay 15,000 feet more.

Water is to be obtained from the cheapest available source of satisfactory character. In some cases it is brought from existing water works and in other cases independent plants are constructed. Storage will generally be required to meet the peak load requirements for an hour's draft at the rate of 156¾ gallons per capita per day. To meet this requirement, either elevated tanks of 300,000 gallons capacity will be provided, or a reservoir of at least 1,000,000 gallons capacity, from which water can be pumped directly into the mains.

In order to reduce the waste and unnecessary consumption to a minimum, the following regulations are to be enforced:

(1) All fixtures shall be shut off when not in actual use.

(2) The fire drill regulations shall make it the definite duty of certain designated individuals to shut off, as soon as a fire alarm is sounded, every fixture from which water may be drawn for purposes other than fire fighting, except those necessary for cooking purposes.

(3) The several brigade units in each cantonment shall make use of the showers at different hours, so that the very heavy peak load resulting from the simultaneous use of all the showers may be avoided.

(4) The use of water for sprinkling roadways and grounds and for the animals shall be so timed as not to coincide with the peaks resulting from the heavy draft for the showers.

SEWERAGE.

In general, the sewerage system of each cantonment will remove house sewage only, although in a few cases surface water may be admitted through catch-basin inlets. The kitchen plumbing includes grease traps to minimize deposits in the sewers. Six-inch pipe will ordinarily be used for kitchen connections, although 4-inch may be used where this size is unavailable.

The trunk sewers are designed on the assumption that the maximum flow at any time will be the maximum from one brigade plus the normal amount from all the other units. The maximum flow from one regimental unit is taken as 1.5 cubic feet per second and the normal flow as 0.5 cubic feet per second. A brigade of three regimental units will therefore furnish a maximum of 4.5 cubic feet per second and the remaining regimental units will furnish 0.5 cubic feet each. Minimum grades are to be obtained, if possible, which will give a velocity of two feet per second when the sewer runs full; but a velocity of 20 inches per second is permitted in special cases. In wet ground and wooded areas special joints are required to prevent seepage and the entrance of roots. Manholes are placed at intervals of from 300 to 500 feet. Vitrified pipe will be used in sizes varying from 6 inches to 24 inches.

Where circumstances permit, the sewage of a can-

tonment will be discharged into adjacent streams without treatment. Where treatment is necessary, it will consist in most cases of discharge into septic tanks holding about 10 gallons per capita, to be located at least 300 feet from the nearest occupied building. These septic tanks will be constructed of wood or of concrete, as the constructing quartermaster may decide. In a few cases intermittent sand filtration will be employed, but in most cases the effluent from the septic tanks will probably be applied to trickling filters 6 feet deep, having an area of about an acre for each 30,000 persons. Settling tanks will be provided to clarify the effluent from the trickling filters, and eventually some method of providing for the disposal of the sludge from these tanks and from the septic tanks must be provided. If, after careful study of conditions, the local conditions seem to demand it, the efffuent from the treatment plants will probably be disinfected by some chlorination process.

CANTONMENT BUILDINGS.

Each cantonment will comprise about 1,000 timber structures, some more, some less, of the simplest possible character, and unpainted. A few buildings used for storage and as garages and power plants will probably be metal clad, and possibly corrugated iron siding and roofing may be employed for them. These are some of the details which have not yet been perfected.

Where buildings are supported on posts more than 15 inches above the surface of the ground and it is possible to keep the ground below them free from inflammable rubbish, the sides will not be boarded down to the ground; but this is to be done where the clearance is less than 15 inches, except in the South, where it is necessary to omit this precaution against fire on account of the greater importance, from a sanitary viewpoint, of permitting a free circulation of air below the floor.

In the South, the two-story building used for large barracks will be heated by stoves on the lower floor, as is done in the Canadian cantonments. It is proposed to jacket the stoves so as to increase the circulation of air and to carry the stove pipes directly up through the second story and roof. Drums will be installed in this stove pipe with air jackets around them, for heating the second story. (This construction is shown in the general plan of a company barrack reproduced herewith.) The smaller buildings in the South will probably be heated by small direct-radiating stoves. In the northern cantonments it is probable that central heating stations will be built and the buildings warmed by radiators.

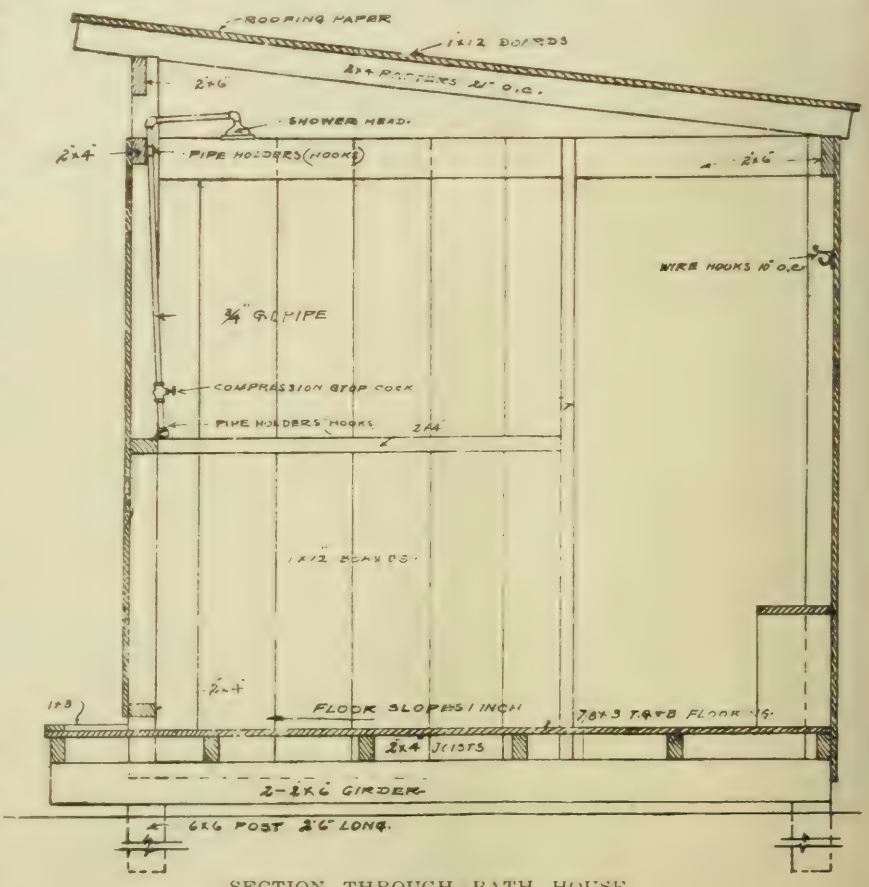
On account of the danger of fire if other sources of light were employed, electricity will probably be used for lighting the buildings, although no money is now available for this. The peak load for lighting is estimated at 600 kw. and the maximum power load at 300 kw. The electrical materials required for the 16 cantonments comprise, among other items, more than 4,000 miles of insulated wiring, 29,500 wire guards for lamps, 250,000 lamp shades, more than 50 miles of lamp cord and other electric fittings in proportion.

It is proposed to use two steel ranges in each large barrack, and cook stoves in the smaller barracks. The kitchens will require 8,000 grease traps, the same number of cast iron sinks and 6,000 range boilers.

The Quartermaster's Department has estimated that the amount of building material required in each of the cantonments will be about as follows: 5,600,000 feet b. m. of boards and 7,800,000 feet of dimension stuff, 177,000 feet of 4 x 4's, 2,800,000 feet of flooring, 1,200,000 feet of siding and 1,400,000 feet of matched boards. This applies to the southern states, while in the northern cantonments the amount of lumber will be increased by about 216,000 feet b. m. In a southern cantonment there will be required 2,500 kegs of nails, 4,800 rolls of sheathing paper, 6,300 squares of 1-ply roofing, 21,900 squares of 2-ply roofing and about 2,110 rolls of tarred felt. In the northern cantonment the amount of 1-ply roofing will be reduced to about 800 squares, while the tarred felt will be increased to 3,200 rolls. Concrete work will require 4,700 barrels of portland cement, 1,400 cubic yards of sand and 2,500 cubic yards of broken stone or screened gravel. The plumbing of each cantonment will require about 100,00 feet of ⅜-inch to 2½-inch galvanized pipe, 1,250 nipples, 2,000 unions, 14,000 fittings, 1,900 shower bath heads and numerous other plumbers' pipes and fittings.

Probably most of the garbage will be burned in incinerators, but studies are being made to ascertain if the fats can be recovered at a cost that will warrant doing so.

The barracks for the men are generally two-story buildings, 43 feet wide, and of different lengths, depending upon the number of men to be accommodated. At one end of each is a single-story kitchen and a pantry and sleeping room for the cooks. A long counter separates the kitchen from the mess hall, where the men living in the barrack will eat. In the center of the first floor is a company hall with doors leading outdoors



SECTION THROUGH BATH HOUSE.

each side of the building and a stairway to the or above. This company hall separates the kitchen om the two first-floor dormitories. The second floor divide up in the same way, except that two more rmitories take the place of the company hall on the st floor. It was originally proposed to have the men ep in double deck bunks, such as are used on large nstruction work and in some college fraternity houses; t the medical advisors of the Secretary of War re- rted so strongly against this that ordinary metal ts will probably be used and the size of the buildings creased to furnish the necessary space. The first story made nine feet high from the floor to the bottom of e beams of the second story. The dormitories are parated by partitions so that the men in each are mparatively isolated from the others, which is con- dered desirable by the army medical department.

There is a ventilating opening running the entire ngth of the ridge of the building, to which vertical nt ducts run from the floor below. Each building has large amount of window area and the sash can be d to one side to secure ventilation. Lavatories for th officers and men are provided in small detached ildings.

The officers' barracks vary considerably in size and ape. Some are long single-story buildings with a tchen at one end, next to this a mess room and then long hall down the center, and opening from it on ch side rooms 10 feet 6 inches by 8 feet 4 inches, and office at the further end of the hall. Other barracks e small single-story buildings, with kitchen, mess room, d from 2 to 4 individual rooms. Still other buildings e two stories high, the larger rooms shared by two ficers, containing an office, mess room and kitchen. few of the officers' barracks will have no kitchen or ess room.

Bath houses of different sizes are to be provided, rying from two showers to ten showers each. The vo-shower house will be 7 feet long and is estimated accommodate from one man to forty men; and in neral two showers will be provided for each forty en or fraction thereof. The two- and four-shower ildings will contain one light each and the larger ildings will contain two lights each. Each of the ildings will be 9 feet deep, and 7 feet front for each vo showers. As shown by the accompanying section, ere will be a seat at the front of each bath house, d over this iron hooks for holding the clothes of the thers. At the rear will be a ¾-inch galvanized iron pe for each shower head, rising to the top of the th house, where it will be provided with a shower ad, the pipe being fastened to the rear of the building steel hooks. About 4½ feet above the floor will be a mpression stopcock for regulating the discharge from e shower. The entire building will be of 2 x 4's and -inch boards, except the 2 x 6 girders upon which the or rests and 2 x 6's used for the main members of the aming. The floor slopes one inch in nine feet toward e rear, where there is an opening two inches high rough the rear wall by which the water can escape. he roof is made of 1-inch boards covered with roofing per. There are two entrances to each bath house, at e two ends, adjacent to the front of the building.

All of the construction work of the cantonments is to e done on the fee system, or cost plus percentage basis. he fees vary from 10 per cent on the small contracts f $100,000 or less to 6 per cent on contracts of more an $3,500,000, the total fee to any one contractor in no vent exceeding the sum of $250,000. This system of warding contracts was decided upon for several reasons. ne of these was that time would not permit the completion of drawings and specifications for the cantonments before the contracts were let, and this permits changing plans after the letting of the contract should such be necessary. The schedule of fees was decided upon after several weeks of study and conference with large contracting firms, which, with few exceptions, acquiesced willingly in the condition that the profits must be kept down to the lowest level consistent with high-grade work. Some firms offered to do the work on a cost basis, but this was considered to be an unwise policy, both economically and nationally, since free service might disrupt the high grade contracting firms best qualified to do the work effectively.

The work involved in each cantonment is not confined to the area covered by it. In most cases new railroad spurs must be built, heavy rails substituted for the lighter ones now in use in existing tracks, sidings built in the vicinity, highways built or improved to provide for trucking, and every possible provision made for handling the enormous amounts of materials without an hour's loss of time. Special telegraph and telephone lines and other facilities are being provided to connect each cantonment with district army headquarters and with Washington.

(To be continued)

QUICK WORK BY SAN DIEGO WATER DEPARTMENT.

These days see rapid work being done in all parts of the country in preparing cantonments for the new army. One such instance is described by F. H. Lockwood, manager of the water works of San Diego, California, in his May report as follows:

"On May 25th information was received that an army cantonment would be established at Linda Vista, and a request for an immediate supply of water was made by the officer in charge. A temporary supply was furnished the following morning by hauling water from the Pueblo farm in tank wagons. In the meantime work was rushed on the installation of a pump at a supply cistern at the Linda Vista station, to which water was shipped via Santa Fe; some 500 feet of pipe was laid to the camp site, and within twenty-four hours after word was received the water was on tap at the camp."

The city has also made arrangements to care for the garbage from this camp, which will be fed to hogs.

THE ENGINEERING COUNCIL.

What is known as the Engineering Council was organized on June 27th, in the rooms of the American Society of Mechanical Engineers, in New York City. This body is a department of the United Engineering Society, serving as a medium of cooperation between the American Societies of Civil Engineers and of Mechanical Engineers, and the American Institutes of Mining Engineers and of Electrical Engineers. According to the by-laws of the United Engineering Society "the Council may speak authoritatively for all member societies on all public questions of a common interest or concern to engineers." The Council is composed of 24 members, 5 from each of the 4 societies named and 4 from the United Engineering Society. The officers elected at the organization meeting were: president, I. N. Hollis, of the A. S. M. E.; vice-presidents, H. W. Buck, of the A. I. E. E., and George F. Swain, of the A. S. C. E; secretary, Calvert Townley, of the United Engineering Society. The executive committee consists of the 4 officers named, together with P. N. Moore, of the A. I. M. E., and D. S. Jacobus, of the A. S. M. E.

At this first meeting, the members of the Council, desirous of helping the government in the prosecution of the war, instructed the executive committee to cooperate with the government in procuring the services of engineers, and also appointed a committee consisting of Messrs Buck, A. M. Greene, Jr., and E. B. Kirby, to consider the best means of utilizing the inventive ability of the members of the founder societies in assisting to the same end.

COVERED RESERVOIR OF REINFORCED CONCRETE*

Built for Mankato, Minn., Water Works—Circular, with Conical Shaped Roof—Designing the Reinforcement—Construction Details.

The reservoir described in this paper was built at Mankato, Minn., in 1916. It is circular, 100 feet in diameter and 25 feet deep, with a capacity of 1½ million gallons, and is covered with a conical-shaped reinforced concrete roof. It was built on a hill composed of red and blue clay. The floor is about 17 feet below the original ground line and the filling around the walls extends to the height of the high water line, which is about 8 feet above the original ground line.

Special attention is called to the following features: 1. The circular plan. 2. The amount of horizontal reinforcement in the walls and the consideration given the earth pressure on the walls to offset the tension due to the inside water pressure. 3. The conical roof instead of a flat slab. 4. Expansion joints between floor and wall. 5. The provisions made for cleaning.

Circular Plan. Where a reservoir is built entirely in solid ground and the outside earth takes the pressure of the water against the walls, no reinforcement is necessary because of this pressure and a square or rectangular plan will somewhat reduce the cost of construction because of less expensive centering. But when the reservoir is empty, the earth pressure on the outside will create stresses in the walls opposite to those caused by the inside pressure when filled. For this reason reinforcement is necessary to take care of this negative stress, unless some other means is provided, such as a gravity wall or other form of construction.

If horizontal tension in the walls is to be taken care of by reinforcement, the circular wall requires the least amount for a given internal pressure. It will also counteract the thrust of the outside earth against the walls when the reservoir is empty without producing tension in any part of the walls. It may be said in passing that the outside thrust against the walls in some instances may be very large, especially if the earth has been saturated by water from leakage or other causes.

The circular types of construction cost more per cubic yard than the square or rectangular, but the saving in reinforcement and in volume of concrete or masonry is sufficient to offset the differences in cost. Therefore I believe the circular plan is the better to adopt in all cases where space will permit its use.

Where a covering over a reservoir is desirable, the cheapest construction, if concrete is used, undoubtedly is a flat slab; it may, of course, have pitch to provide proper drainage. The method of supporting the roof will depend on the depth, size and shape of the reservoir. If the reservoir is not deep, a large number of pillars from the bottom will reduce the size of beams, and vice versa. To find the most economical construction, each case must be studied by itself. There will always be a certain length of span at which the cost of construction will be the minimum. The most economical condition must be found by trials and estimates in each case.

There are instances, however, when economy must give way to some other desirable features. Too little attention has been paid in this country to the aesthetic features of permanent structures. In the use of concrete, the general appearance of a structure may be greatly improved at very little cost above a strictly economical design. In this case, after some consideration to the aesthetic side of the result, it was decided that the most desirable covering was a conical shaped concrete roof supported by reinforced concrete beams inclosed with a curtain wall above the top of the wall proper. The roof rests on the outside walls and seven pillars, one placed in the center and six in a circle 60 feet in diameter around the center pillar, making the longest beams 30 feet in horizontal length between centers of support.

The roof slab is 4½ inches thick, being 4 inches of 1-2-4 concrete and ½ inch of mortar coating troweled to a smooth, hard finish. The roof slab is reinforced with ⅜-inch steel rods 8-inch centers laid one way only, and with a network of steel wire netting of 4-inch mesh with double No. 8 wire longitudinally and No. 12½ crosswise. The amount of reinforcing is sufficient to carry a loading of 100 pounds per square foot of surface, besides its own weight. The roof beams are arranged about 12 feet apart.

In the resign of the roof slab no consideration was given to the arch action of the slab due to the conical shape of the roof. This is a variable amount at different places of the roof, and while it would be sufficient to consider in calculating the amount of reinforcement, it was not taken into account; its value will therefore go toward increasing the factor of safety.

The necessary amount of horizontal reinforcement in

FRAMEWORK FOR ROOF BEAMS.
Beneath may be seen support for roof centering.

*Slightly abbreviated from a paper before the Minnesota Surveyors' and Engineers' Society, by H. F. Blomquist, city engineer of Mankato.

the walls, depending upon the amount of earth pressure that may safely be taken to neutralize the stress due to the inside water pressure, will of course depend on the nature of the ground and the care exercised in filling around the walls after the forms are removed. With care in refilling the clay soil, the earth thrust ordinarily is more than sufficient to counteract the pressure due to water extending from the surface of the ground to a given point in the wall. There would, however, be certain times when the upper layer of the earth, say the surface layer about 6 feet thick, would not act as a support to the walls, because, during very dry condition of the ground, contraction takes place in it so that it recedes from the adjoining surfaces. This is also true in very cold weather when the ground freezes.

For this reason no support from the upper 6 feet of the ground surface should be assumed. In our design the horizontal reinforcement in the upper 15 feet of the wall is sufficient to take the entire tension due to the inside water pressure at a unit stress of 16,000 pounds per square inch, with a surplus amount near the top to take care of ice thrust in case of ice formations on the water. The reinforcement in the lower 10 feet of walls is not sufficient to take all the tension at 16,000 pounds as a unit stress. About 40 per cent of the tension is here assumed to be taken up by the outside earth thrust, and with no tension being assumed in the concrete it is safe to assume the design has the proper factor of safety.

The floor consists of 10 inches of concrete reinforced with ⅜-inch rods laid both ways 9 inches apart. The floor was constructed after the walls and roof had been completed. A ¾-inch expansion joint connects the floor and walls, also the floor and pillars. This joint was caulked with oakum, and filled with an asphalt filler. The floor slopes from the walls toward the center, being 18 inches lower at the center than at the walls.

METHOD OF CONSTRUCTION.

On account of the firmness of the ground, it was intended to trim up the sides after the excavation had been made so that no outside forms would be necessary for the walls below the surface of the ground. But hard rains during the time of excavation caused some slides to occur so that forms were needed for about half of the walls.

After the excavation had been completed, we built the forms for the entire wall and the six large roof beams radiating from the center, also the supports for the centering of the roof, before any part of the wall, except the foundation below the floor line, had been poured. The reinforcement was placed in the wall at the time of building the forms, and was supported by two 2-inch angles laced together for this purpose. These supports rested on the concrete foundation already poured for the walls, and were placed at intervals of 10½ feet and carried the entire horizontal reinforcement. These angle supports, together with ¾-inch rods 2 feet apart, form the vertical reinforcement of the walls.

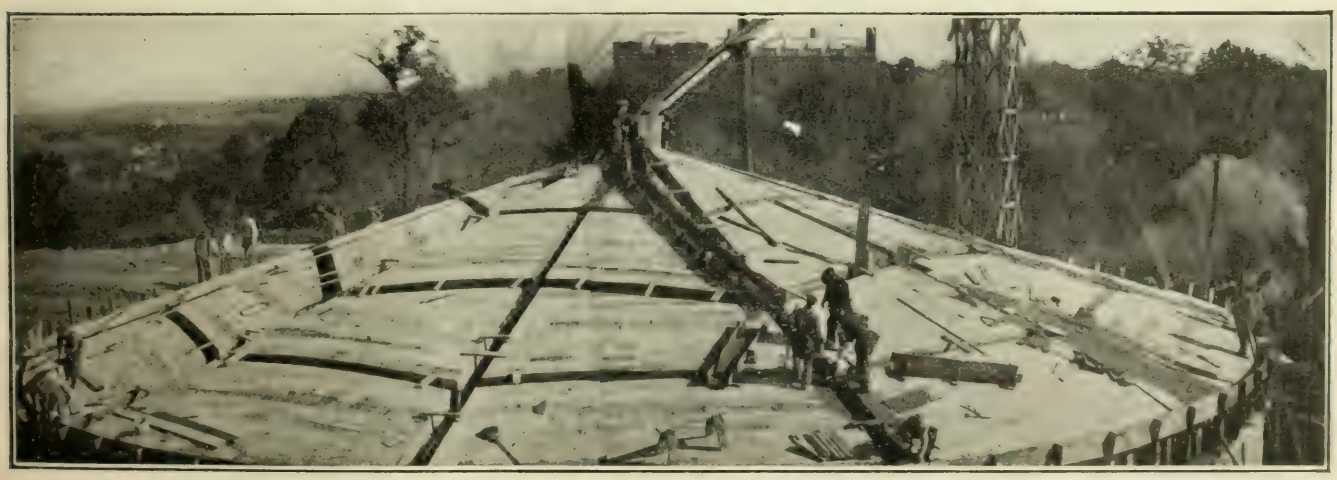
POURING ROOF SLAB BY CHUTE FROM TOWER.

All the concrete for the entire structure, except for the foundations and the floor, was distributed from the hopper at the center of the roof, the radiating forms for the roof beams acting as chutes to different points around the wall.

The mixer was placed in a pit below the surface of the ground near the wall and the concrete hoisted in a tower about 60 feet above the surface of the ground, from which it was run through an inclined chute to the hopper at the center of the roof.

All the material was on the ground before pouring of the walls was commenced, because they were to be poured in a continuous operation to avoid horizontal seams forming where concrete would set between pourings if done intermittently. The sand and crushed stone was taken from the material bins to the mixer in dump cars.

The pouring of the walls was done in four days and four nights without stopping the mixer at any time for more than one hour, and the concrete deposited at different points around the wall in rotation so that no part of the surface had set before new concrete was added. Small openings in the forms were left for working the



ROOF CENTERING IN PLACE. POURING A ROOF BEAM.

concrete in the walls to prevent voids, and these were closed up as the filling progressed.

The walls are 24 inches thick at the bottom and 15 inches at the top.

After the walls had been completed, the forms for the roof beams were cleaned and completed and the centering laid for the entire roof slab before the beams were poured. The centering for the roof slab was all supported by staging from the bottom. The form work, centering and supports for roof beam and slab required about 100 thousand feet of lumber, but the greater part of this did not require cutting, and therefore the waste was not more than about 15 per cent.

The reinforcement was then placed in the beams and all the beams and curtain wall poured. After the beams had been completed, the reinforcement was placed for the roof, and the concrete afterwards poured. The concrete was mixed sufficiently stiff to prevent sliding or running when placed on the inclined roof, which has a rise of 15 feet in 50. The roof slab was finished with a ½-inch mortar surface trowled to a hard, smooth finish.

The mixture of the concrete in the foundations is 1-2-5, and of all the walls, roof and floor is 1-2-4. Crusher-run limestone passing a 2-inch ring was used for the coarse aggregate. As an aid toward waterproofing the concrete in the floor, walls and roof slab, 20 pounds of hydrated lime was used with each barrel of cement used, the lime being first thoroughly mixed with water.

For waterproofing the concrete surfaces, two plastering coats were applied, consisting of 1 to 2 cement mortar to which was added Truss-Con Waterproofing Compound, and then the surfaces given a brush washing of cement grout.

Provisions are made for draining out all the water in cleaning, and since there is a separate system of water supply for the hill district, a 4-inch pipe line from this system was laid into the reservoir and provided with a 2½-inch fire hose nozzle so that a fire stream of 60 pounds pressure may be used for cleaning.

The reservoir has been in use about two months and no visible leakage has so far taken place.

The work was done by the J. B. Nelson Construction Company of Mankato under contract at a cost of $19,373.

The new reservoir is used in conjunction with the old masonry reservoir of about 800,000 gallons capacity, and was constructed primarily for the purpose of increasing the storage capacity of the waterworks system for fire protection.

BRIDGE MAINTENANCE IN PHILADELPHIA.

During 1916 the first permanent floor laid by the city of Philadelphia upon a structure not originally designed for an improved type of pavement was constructed in the form of a new wood block pavement on the Calumet street bridge. In constructing this pavement the old wooden floor beams were replaced with steel I beams, on which was laid a waterproof sub-deck of 4-inch yellow pine. On this sub-deck were then laid the wood blocks, having previously been dipped in a hot bituminous compound. The blocks were laid loosely and an expansion joint was provided along the curb line. At intervals of twenty feet a transverse angle iron was laid from curb line to curb line in order to overcome the creeping tendency so noticeable in wood block floors on bridges. Where wood block is not practicable, the city uses 4-inch white oak laid diagonally. Although this loses its smooth appearance more quickly than yellow pine, it is more desirable on account of its toughness, its ability to resist abrasion and its greater tensile strength.

Like most other cities, Philadelphia finds its iron and steel bridges deteriorating rapidly where they pass over steam railroads, owing to the effect of sulphurous gas and locomotive blasts. How best to prevent this is still an open question in that city. The erection of wooden smoke shields over track lines, while it permits free air to circulate around the structure, requires almost constant attention to keep them in order. On the other hand, the erection of steel blast boards over a trackage area equal almost to the total area of the bridge from abutment to abutment is found to be almost prohibitive on account of the high initial cost. No more effective means of protecting the metal work has yet been devised than a systematic cleaning and painting of the structures, provided, of course, that this is done at regular intervals.

The progress of bridge designing during the past twenty years has been such that it is estimated an ultimate saving would result if all the bridges of the city of the girder type of construction with wood floors and of 150-foot span or less were to be replaced with steel encased in concrete. None of the bridges constructed in this way since 1900 have cost the city one cent for maintenance up to date. Concrete arches and concrete-encased girders built on the improved designs of the last ten years have shown no evidence of wear or deterioration, justifying the increased initial cost of these types of bridge structures.

MILITARY ROADS IN FRANCE.

Information under date of June 5th has been received from the battle front in France, near Bapaume, in a letter written to George C. Warren, president of Warren Brothers Co., written by W. G. MacKendrick, Lieut.-Col. and Assistant Director of Roads, president of the Warren Bituminous Paving Co. of Ontario. Col. MacKendrick has been connected with military road construction at the front for about two years, and gives some very interesting narratives concerning some of his work in that connection, from which we have prepared the following brief statement.

Roads in the vicinity of the battle front in France and Belgium are macadam, some having stone blocks on sand foundation in the center of the road; except that in towns and villages the main street is generally of such stone block, or stone "setts." The macadam is of light construction, generally 4 to 6 inches of gravel or stone and a few inches of chalk or sand, and they go to pieces quickly under the 3-ton and 5-ton trucks, guns, etc., which are continually using them within the army areas. As a result, the road force of several thousand men is kept constantly busy, especially in the fall, winter and spring, trying to keep them in a passable condition by the use of slag, mine refuse, chalk, old bricks from destroyed villages, or anything that can be had. In swampy places or bad mud holes, railroad ties are used, spiked down onto three longitudinal stringers, or 3-inch planks in place of the railroad ties.

In building new roads, telford macadam was used, but it was found that the soil was too soft for the ordinary method of construction, the huge trucks driving the large stones of the base into the soft soil, and consequently it was found better to lay the large stone on their sides rather than standing them upright. The macadam was placed on top of these, mud from the side of the road being used as a binding material. In winter the traffic has to compact this macadam surface, since rollers block the traffic too much and are apparently impracticable. The road from Albert to Bapaume was rebuilt and recoated in this way, and carried all of the army traffic until May, after which a regular coating of macadam was put on,

and eight road rollers working two shifts per day put it into shape.

Time is the factor in all advance work, as from the minute an advance is made by the infantry the guns must go up in support and munitions must be kept constantly serving the guns; consequently anything practically available is used in keeping up the roads. Brick from destroyed buildings in the nearest village is the favorite material. The traffic grinds this into powder, and in wet weather into mud, so that it has to be renewed every day or two, but was found to be the best that could be obtained, considering that stone cost $7.50 a ton and wasn't available at any price. In bad, muddy spots, trees, old sleepers, rafters and other timber from houses in demolished villages, anything that will help to make a solid roadway and enable guns and regiments to keep moving, is used for the purpose. In some cases the roads first built could be used only for horses pulling in ambulance carts, and limbers could not be taken in for several days or even weeks. Col. MacKendrick stated that he had had 10,000 to 12,000 men working for many months and used as much as 2,000 tons of road metal a day, not counting corduroy, railroad ties, pit props or brick. When possible, the method employed is to fill holes with broken bricks until level with the surface and then cover the entire road with 4 to 6 inches of macadam. These holes are not always or even often those made by the traffic, but are most frequently caused by the enemy's shells; in the worst spots some 80 to 90 per cent of the road being torn up by shell fire. All the time that this repair work is being done the traffic must be kept going, moving in both directions on roads 16 to 18 feet wide.

The Colonel states that what is wanted in the road engineering force in France is adaptable men who can secure results with any old thing they can lay their hands on. The cost of the work is a small item; labor is apparently abundant, Boche prisoners being used for this work to a large extent.

PRIZES FOR PAPERS ON PLUMBING.

On August 1, 1916, through the courtesy of the Cast Iron Soil Pipe Maker's Advertising Association, three prizes known as the "The Nelson Prizes in Plumbing" were offered for the best papers on subjects having to do with the theory or practice of plumbing. The committee in charge consisted of George C. Whipple, Professor of Sanitary Engineering, Harvard University, Cambridge, Mass.; Dwight Porter, Professor of Hydraulic and Sanitary Engineering, Massachusetts Institute of Technology, Cambridge, Mass.; Gifford LeClear, of Densmore & LeClear, Engineers and Architects, Boston, Mass.; and Harry Y. Carson, of the Central Foundry Co., New York City.

Chairman Whipple has announced that the prizes have been awarded as follows: First prize, $100, awarded to Thomas J. Claffy, assistant chief Sanitary inspector, Health Department, Chicago, Ill., for a paper entitled "Plumbing." Second prize, $50, awarded to James W. Anderson, student, graduating in the class of 1917 from the Massachusetts Institute of Technology, Cambridge, Mass., for a paper entitled "A Study of the Different Types of Pipes used in the Disposal of Rain Water from Buildings." Third prize, $50, awarded to Walter G. Ward, instructor, North Dakota Agricultural College, Agricultural College, N. D., for a paper entitled "Water Closet Connections."

These prizes were offered to students or instructors in any institution of learning who have had training in the theory or practice of house drainage, also to any who have had practical experience in installing house drainage systems. It is planned to offer $750 in prizes in a similar contest next year, possibly also a fellowship in Harvard University. The desire is to bring out in these papers defects in existing practice and feasible improvements therein.

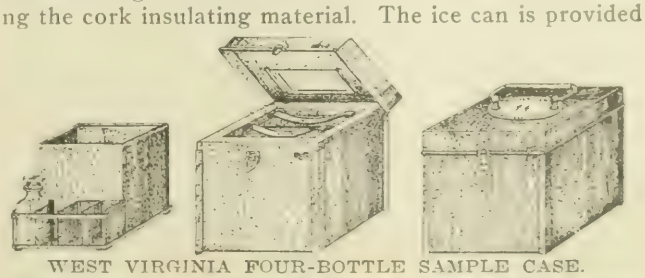
SHIPPING WATER SAMPLES

Description of the Four-Bottle Case Furnished to Cities by the State Board of Health of West Virginia for Sending Samples.

The Division of Sanitary Engineering of the State Board of Health of West Virginia has adopted a standard container for shipping samples of water for the bacteriological analyses required by the regulations of the Public Service Commission; which container is described as follows by Mayo Tolman, chief engineer of the board, in the biennial report just issued.

One of the first requisites of such a container is that it shall keep the sample at a low temperature for a considerable length of time. This is particularly true in West Virginia, as distances by railroad are often great, and the State Hygienic Laboratory is unfortunately located off the main line of any railroad, and consequently has poor train service. Unless samples for bacteriological analysis are kept at a low temperature (below 40° F.) the bacteria are apt to develop with the result that the analysis will show a far higher bacterial content than actually is the case. However, size, weight and portability must not be sacrified to the maintaining of low temperature over extended periods of time. It is also essential that a bacteriological sample box shall be strong enough to stand repeated shipment by express. A number of makes were investigated, but they were each deficient in one point or another. The great drawback with the majority was that they were far too clumsy. It was then decided to design a new container along lines similar to that of the bacteriological sample box adopted by the Maryland State Board of Health while Mr. Tolman was in the employ of that body. The construction of the container as finally adopted is shown by the accompanying illustrations.

The boxes are made entirely of galvanized iron and are double walled, the space between the two walls being filled with ⅞ of an inch of nonpareil cork board, which is one of the finest insulating materials known. The inner box is made of No. 27 gauge, galvanized sheet iron, while the outer walls are No. 27 gauge, and the bottom of No. 22. The edges are protected with brass angles that are tightly soldered to the sample box. The bottles, which are "French squares" 50 cubic centimeters in capacity, are held in individual racks soldered to the ice compartment. This compartment, which varies in capacity according to the number of bottles the container is designed to hold, is removable, thus greatly facilitating the handling of the sample bottles and affording a double protection against the water from the melting ice reaching the cork insulating material. The ice can is provided



WEST VIRGINIA FOUR-BOTTLE SAMPLE CASE.

Dimensions, 8⅛ x 6⅝ x 8⅛ inches high. At the left, combined bottle holder and ice compartment removed from case. In the middle, case with lid raised showing bottle holder in place and separate lid used to prevent stoppers of bottles from shaking loose and cover to ice compartment. Also slotted holder for instruction sheet.

with a cover that has a flat spring on its top that presses against the cover of the sample box when closed. A flat strip of galvanized iron with a similar spring on one side has been provided to rest on the stoppers of the sample bottles, thus effectively preventing their becoming loosened during transit. Each container is provided with a brass handle and name plate; the latter stamped with the name and address of the water utility to which it belongs.

While no tests have been made to determine the length of time that the container will maintain the water at a low temperature, samples have been found in a satisfactory condition after 36 hours, if properly iced at the start.

ELECTROLYTIC CELL CHLORINE FOR WATER STERILIZING

Description of Method and Apparatus Employed for Treating the Public Supply of Montreal, Canada—Cost Compared with Hypochlorite.

The Montreal Water and Power Co. treats with chlorine the water delivered by it for public consumption; but in applying the chlorine uses neither hypochlorite nor chlorine gas as is the practice in most plants, but instead obtains the chlorine by use of the electrolytic cell. This plan has been in operation since the first part of this year. It was described in a paper by F. H. Pitcher and James O. Meadows before the American Water Works Association, from which the following description was abstracted.

The process makes use of the well-known fact that salt dissolved in water can be broken down into its elements, sodium and chlorine, by electrolysis. Chlorine gas is liberated at the positive electrode and metallic sodium at the negative. The latter immediately combines with the oxygen in the water, forming caustic soda and liberating hydrogen. The chlorine gas and caustic soda combine to form sodium hypochlorite. This last action is objectionable since the hypochlorite is comparatively weak, the electric current decomposing it after it reaches a certain strength. The chlorine must therefore be prevented from combining with the caustic soda. This is effected in the plant used at Montreal by a diaphram between the positive and negative electrodes.

That plant consists of a salt storage bin of 40 tons capacity, a brine saturating and purifying equipment, two 15 h. p. motor generator sets, four chlorine cells, silver ejectors and distributing lines for applying chlorine water to the water to be treated.

The brine saturating equipment consists of three vertical galvanized iron saturators 27-in. diameter by 6 ft. 6 in. high, provided with a spray system at the bottom and an outlet 6 in. from the top; also two concrete reaction tanks, each with a capacity of 82 cu. ft., with sloping bottoms and provided with a pipe grid for air agitation. Two sand filters are provided for filtering the brine. From these the brine passes to two concrete storage tanks having a capacity of 276 cu. ft. each.

The chlorine gas is ejected into water by means of a silver ejector which maintains a 4-in. vacuum on the chlorine cells. The water so treated with chlorine is lead to the water to be purified by one-inch chemical hose lines.

In preparing the brine, a small quantity of water under pressure is allowed to flow in at the bottom of the saturators, which are charged with salt, and a saturated solution of salt is formed and flows to the reaction tanks. In these, enough soda ash is added to combine with the calcium and magnesium salts in the brine, and the liquid is agitated for half an hour and allowed to stand for an hour to let the precipitate settle. The solution is then filtered through the sand filters into the storage tanks. Just enough hydrochloric acid is added to neutralize the alkalinity and produce an acidity of about .01 per cent, so as to prevent the formation of hypochlorites within the cell.

There are four electrolytic cells of the Allen-Moore type, each a standard 600 amp. unit 7 ft. long by 20⅜ in. wide, provided with Acheson graphite anode plates and pure wrought iron perforated cathode plates. The box is made of concrete protected to withstand the action of acids. Asbestos paper is used for the diaphram. The four cells are connected in series and provided with short circuit switches or cut-outs. The voltage carried on each cell is approximately 3.3 volts, and each cell is capable of producing 32 pounds of chlorine per 24 hours.

Three of the four cells, producing 90 pounds of chlorine gas a day, furnish a sufficient amount for sterilizing the supply at a cost of 7.6 cents per pound. This cost is based on salt at $8 a ton, power at $30 per h. p. year, interest 6 per cent on $5,000, depreciation, 15 per cent, and labor and superintendence $1.37 a day. The cost of using hypochlorite for the same service previous to the installation of the chlorine cells was 13.4 cents per pound of available chlorine, the chloride of lime costing 3.75 cts. per pound (33 1/3 per cent available chlorine), interest on $2,500 at 6 per cent, depreciation at 5 per cent, and labor and superintendence $1.37 a day.

With normal market conditions the annual cost of the two forms of treatment would be approximately the same if no consideration was taken of the general depreciation that chloride of lime causes about a water purification plant.

An electrolytic chlorine cell functions at its best when under a constant current load, and for this reason it is good practice not to vary the load, or if varied to bring about the change gradually. Variations in load cause a considerable deterioration of the diaphragms, with a consequent loss in cell efficiency. For this reason automatic control of the chlorine production from an electrolytic cell is not practical, and for the treatment of a large volume of water without appreciable variations in volume, automatic control is not required, for the dosage can be regulated for the maximum requirements without causing tastes or odors during the minimum consumption periods. The three cells required to supply the chlorine consumed for sterilization are operated with a current load of 500 amperes and 13 volts. The electrolytic cells require very little attention and up to date have given excellent satisfaction.

The chlorine cell installation was adopted because of the saving effected over the present high price of chloride of lime, and inability to secure this chemical with any degree of certainty; and also because common salt is very much easier to handle around a water purification plant, and its use in the chlorine cells does not cause the general deterioration about the works that the use of chloride of lime does. Over-dosage with chlorine does not cause the trouble that chloride of lime over-dosage does, because odors and tastes are not present to the same degree.

The short experience at Montreal with chlorine cells for the sterilization of a public water supply indicates that an installation of this kind is perfectly feasible for large water supplies where the cost of power is not excessive.

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PLUMBING AS A SCIENCE.

It is not so many decades since the planning and constructing of sewerage systems, and everything which had to do with the subject, were considered to be matters of minor importance and were determined entirely by plumbers or others who had practically no scientific knowledge. This has been entirely changed and technical men with as high standing as any in the engineering profession now make a specialty of this class of work.

This applies to the public sewerage system, including both the lines of pipes as they are laid in the street and the disposal of the sewage so collected; but that portion of the system beginning with the street and ending with the house plumbing has not yet been made a serious study by any considerable number of engineers or other scientifically educated specialists. And yet the total amount spent in the construction of these terminals of the sewerage system and their importance to the citizens who use the system are as great as those of the publicly owned pipes and appurtenances. It is true that improper designing or construction of the sewer connection and plumbing that serves any one house is of little importance to the occupants of any of the other houses of the city; but the effect upon the occupants of the house in question is fully as great as would be a defect in the general sewerage system. It follows that general defects found in the plumbing of all the houses in a city are as serious a matter as those existing in the public portion of the sewerage system.

It seems to be high time, therefore, that technically trained engineers should give more attention to house plumbing and sewer connections, with a view to perfecting methods in respect to these and embodying their views in such ordinances, regulations and licensing of plumbers as will secure the best designs and highest grade of workmanship.

Such an improvement in plumbing methods is apparently foreshadowed by the recent awarding of prizes for essays on plumbing, which prizes were awarded by professors of sanitary engineering in Harvard University and in the Massachusetts Institute of Technology, the writers of two of the essays receiving prizes having been a student and an instructor, respectively, in technical colleges. As this was required by the donor, it is apparently his aim to bring about in these schools a greater interest in this branch of sanitary engineering.

SANITATION IN THE CANTONMENTS.

The United States is extremely fortunate in having the experience of England and France from which to draw in preparing itself for war, and apparently the officials are sufficiently wise to take advantage of this experience. This is the case with reference to the sanitation of its cantonments. As stated several months ago in Municipal Journal, the English acted on the belief that the war would be of comparatively short duration and the camps in England at which the recruits were assembled and trained were built with the idea that they would be occupied but a brief time. One result of this was that practically no attention was paid to the sewering of the camps and to the disposal of other waste matters, with the result that in a very few months the conditions became more or less serious and immediate and radical steps were required to put the camps into a condition of sanitation and safety.

Quite the reverse is the case with the United States cantonments now under construction, details of which are described elsewhere in this issue. The water supply and sewerage of each of these cantonments is studied by sanitary specialists such as Allen Hazen, Frank A. Barbour, R. W. Pratt, Geo. W. Fuller, Leonard Metcalf and other well-known engineers, and as many precautions are being taken to secure a safe water supply and to dispose of the sewage in such a way as to entirely eliminate all dangers or nuisances therefrom as would be the case with a permanent city of the highest type. In most cases the water is obtained by wells driven especially for the purpose; while vitrified pipe sewers are laid throughout the camp and the sewage is treated by septic tanks, sprinkling filters, intermittent filters or other of the most modern sewage treatment methods, or else discharged at a distance from the camp into flowing streams where this is possible without creating a nuisance.

As to the details of the camp, one illustration of the care being taken of the health of the recruits is the fact that the sanitary advisers objected strongly to double-deck bunks and their advice is to be followed, and only regulation iron cots will be employed.

Also, in most cases, and possibly in all, the camp site has been chosen with a view to natural drainage, many of them having sandy or gravelly soil into which the rain water will soak quickly, and this also will, of course, be of great assistance in maintaining the men in good, healthy condition. With the reputation which our army officers have already made for improving the sanitary conditions of camps and cities in Cuba and Panama, there can be no question that the camps will be maintained in the most sanitary conditions possible, and there is every reason to believe that the men will really be maintained in a better physical condition than they would have been in their own homes.

STATE FEDERATIONS OF TECHNICAL SOCIETIES.

The following letter, a copy of which has been sent us by Mr. Hazlehurst, would seem to be of general interest to members of engineering societies, and is published in order that the suggestions made therein may be considered by them:

July 6, 1917

Mr. Frederick H. Newell, Member,
Engineering Council,
Professor Civil Engineering, University of Illinois,
Urbana, Ill.

My dear Mr. Newell:

From recent technical press news, I have noted with great pleasure the organization of an Engineering Council, representing at present the four great Engineering Societies. I am also much pleased to know that you have been appointed a member of this Council from the Society of Civil Engineers. I feel sure that this is a step in the right direction, and along lines which you and some of the rest of us have been advocating so strongly.

Personally, however, I do not feel that it goes far enough, and believe the five societies, representing the strongest engineering elements in the United States, should be organized into state groups along the lines which we have adopted here. At this time we have a Georgia federation of technical societies, consisting of the following members on the Executive Committee: A. J. Schoen, chairman, Am. Inst. of Elec. Engineers; Gabriel R. Solomon, M. Am. Soc. of C. E.; Oscar Elsas, M. Am. Soc. of M. E.; G. W. McCallie, M. Am. Inst. of Mining Engineers; F. M. Smallie, M. Am. Chemical Society.

Within the City of Atlanta proper, there is the Affiliated Technical Societies of the City of Atlanta. The societies represented in this lesser organization are as follows:

American Society of Civil Engineering, American Society of Mechanical Engineers, American Institute of Architects, American Institute of Electrical Engineers, American Chemical Society, Engineers' Association of the South.

Each of these societies supply two members of the Executive Committee, and of which the writer at this time happens to be chairman.

Enclosed herewith you will find a booklet giving the by-laws of this local organization.

Since the affiliation of these local organizations, July 15, 1913, much has been accomplished for the public good and for the promotion of the societies' welfare and individual interest. Amongst the things that have been accomplished has been the incorporation into a State Highway Commission law of three technical members, viz., the Dean of the Engineering School of the University of Georgia, the Professor of Highway Engineering of the Georgia School of Technology and the State Geologist. In the City of Atlanta a Board of Consulting Engineers has been created and appointed by the Mayor, representing the American Society of Civil Engineers, American Society of Mechanical Engineers, the American Institute of Electrical Engineers and the American Institute of Architects. The writer has also the honor to act as chairman of this Board of Consulting Engineers for the City of Atlanta, and the board's advice and opinions have already been of considerable weight in moulding legislation along technical lines.

For instance, the board has just completed its report on the necessities and requirements of Atlanta Water Department, which contemplates very important additions to the pumping station equipment, the filtration works, the river intake, etc., the expense involving an estimated cost approximating three-quarters of a million dollars.

It would seem to the writer that it is along these lines where we can best hope to succeed in bringing the membership of the technical societies to the front in matters of local importance, especially, and in rendering to the community high service along technical lines.

In order to create and perfect such an organization, it is undoubtedly essential that there should be a field secretary employed by the parent societies, and this letter is by way of suggestion and in the hope that as a member of the Engineering Council you will approve of the plan as above outlined and will use your influence in the council to bring this about.

Perhaps it might be of interest for you to know that the executive members of the Georgia Federation are those appointed by the Naval Consulting Board as associate members, and it would be along the line of easy accomplishment to request that members who have been serving on the Naval Advisory Board in other states continue their good work as executive members of state federations.

Thanking you in advance for your assistance along these lines, which seem to the writer to be entirely practical, and have at least shown good results in this state, I am,

Cordially yours,
JAMES NISBET HAZLEHURST.

ELECTRIC REFUSE COLLECTION TRUCKS.

Dover, England, uses electric trucks for refuse collection with good results. Some of these vehicles have been in service nearly two years and operating costs are available for a period covering the first fifteen months. These data, which were published in a recent number of the London Electric Vehicle, show a considerable reduction in cost over the use of horse-drawn vehicles.

Five 2.5-ton trucks are employed, and these in the 15 months have dealt with 12,741 tons of house refuse—at the rate of 849 tons per month. In addition, the vehicles have done other work for which revenue was directly earned, such as conveying ashes from the docks and general carting for other departments. The comparatively small amount of such revenue-earning work done was due to the increased amount of house refuse that had to be dealt with—an average of 45 tons extra per week over the amounts the previous year. In the days of horse haulage this would have necessitated the employment of five additional horses and carts at an extra cost of $4,550 per year—an expense which the use of the "electrics" has saved.

It should be noted that not all the vehicles have been in use the full 15 months, the last delivered having been at work only seven months.

The expenses connected with operating the five electric vans for the 15 months are as detailed below:

Total mileage, 28,825.
Total annual mileage, 23,000.
Total quantity of refuse collected, 12,741 tons.

Table of Operative Costs of Electric Vehicles at Dover for Fifteen Months.

	Totals.	Percentage of Total Cost.	Cost per Mile (Cents).
Actual wages paid.....	$5.885.16	48.20	20.42
Proportion of foreman's wages	186.62	1.60	0.65
Wages of man at tip.....	243.60	2.02	....
Rents of two tips.....	302.00	2.50	....
Repairs and maintenance...	581.24	4.75	2.02
Stores and sundries.....	63.68	0.55	0.22
Tires	336.24	2.60	1.17
Capital charges on vehicles (capital cost of each vehicle, $5.630)	3,032.40	24.85	10.52
Electrical energy at 3c. per KWH.	1,396.14	11.43	4.84
Insurance	180.00	1.50	0.62
Totals	$12.207.46	100.00	40.46

*Capital charges reckoned upon five vehicles in use from seven to fifteen months.

Thus the total cost per ton of refuse collected was $0.919, which contrasts most strikingly with the previous cost of collection by horses and carts $1.48 per ton. The total cost per mile, excluding wages and capital charges, was $0.085.

FIRE CHIEFS WANTED FOR FRANCE.

The Government wants at once for service in France a fire chief and assistant fire chief (salaries: $1,500 and $1,200, with quarters and subsistence) who can speak French and who are capable of organizing a fire department in connection with warehouses containing military stores. The salary cannot be considered as any indication of the grade of men wanted. Personal character must be above the average. A chance for patriotic service. Address Franklin H. Wentworth, Secretary National Fire Protection Association, 87 Milk street, Boston, Mass.

The WEEK'S NEWS

State Highway Progress in Iowa, Texas and Kansas—Motor Vehicles in the United States—The Army's Sanitary Corps—The Passaic Valley Sewer—San Francisco's Hetch-Hetchy Development—Opposition to Meters in New York City—Competition Rates for Municipal Light Plants in Ohio—New Jersey Cities Fight Gas Standard Reduction—Merit System in Houston Police Force—New York City's Public Service Commission Ten Years Old—Auto Traffic Regulation in New York City and State—Portland, Ore., Develops Its Port Facilities—Tree Planting in Baltimore.

ROADS AND PAVEMENTS

Road Scales Used in Traffic Survey.

Ames, Ia.—It is claimed that for the first time in any state, a "complete" survey of road traffic in Iowa has been undertaken by the engineering experiment station at Ames and the state highway commission. The survey, which will show type, amount and weight of traffic, will be valuable in connection with the use of the federal aid road appropriation to the state, in determining the necessary type of surfacing for different roads and fairest road tax apportionment for different counties. The first survey has just been completed on the Ames-Des Moines road near Ames, when, for a ten-day period, accurate count was kept by means of a novel set of road scales, of all traffic passing on the road. During the period, traffic weighing 4,919,456 pounds passed on this road, carried by 1,995 vehicles, hauling 5,561 passengers. The type of traffic was as follows: 1,394 touring cars, 213 roadsters, 59 motorcycles, 41 bicycles, 44 motor trucks, 1 tractor, 172 horse passenger vehicles, 61 horse freight vehicles, 2 saddle horses, 1 planter and 3 hayracks. The present, it is observed, is not a heavy season for rural traffic. Of the 1,995 vehicles, 647 represented farm traffic, 1,227 interurban and 121 tourist. On Sunday, June 24, alone, more than 1,000,000 pounds of traffic passed the road. The scales have been shipped to Sioux City where the next survey will be made. Roads in Woodbury, Webster, Delaware and Johnson Counties will probably be surveyed by October 1.

To Test Texas Road Law Constitutionality.

Austin, Tex.—An attack on the constitutionality of the law creating the state highway commission is to be made, according to R. B. Humphrey, an attorney of Austin, and a former member of the legislature. Mr. Humphrey said that he has been retained by certain persons, presumably automobile owners, of Austin to make a test case of the act to determine its constitutionality. He insists that the act is discriminatory in that it taxes a special class, that is, the owners of motor cars, while the owners of horses and buggies escape taxation. He also contends that the registration fee is a tax and is not authorized under the constitution. Meanwhile, the state highway commission has divided the state into six districts planned by state highway engineer Duren. A statement by Curtis Hancock, chairman of the commission, says: "We expect the proprietor of each garage in every locality, every accessory house and others to distribute these application blanks as widely among automobile owners as possible. Heretofore the law for registering automobiles has placed the duty upon the county clerks of the state, for which they have been paid 50 cents for each registration. Now the law imposes this duty of registering cars with the commission by the owner. There is certain information necessary to be furnished on the application blank, and every automobile owner in this state will do well to learn the engine number of his car, his car number, the model and make of his car, its actual horsepower, and the amount of money to be remitted to this department for one-half year to January 1, 1918, in order to obtain his license." At a meeting held in Mineral Wells, the commission officially designated twenty-five routes throughout the state. All of the twenty-five state highways may be improved by both state and federal funds, through county commissioners' courts throughout the sections which they traverse. The twenty-five highways constitute a veritable network of roads radiating from every corner of the state and extending to and through the opposite corners. Although counties may make application for both state and federal aid in building and maintaining good roads, this aid will not be granted without the approval and indorsement of the state highway commission. By designating the twenty-five state highways the commission did not obligate itself to indorse or approve requests for aid only if asked in connection with these highways, but it is expected that counties desiring to improve the sections of these highways by which they are traversed will be given every encouragement. As soon as the state highway commission's revenues begin to come in, work on the Texas roads and highways will begin as prescribed by the act, according to Hancock. Although the law prescribes that 50 per cent of the income of the commission shall be returned to the counties from which it was collected, the commission is empowered in such a manner as to influence the improvement of certain highways which it deems most important to general welfare to have improved, Mr. Hancock said.

Reject 28 Blocks of Pavement.

Jefferson, Ia.—The city of Jefferson and the Ford Paving company will let the court settle the matter of some twenty-eight blocks of asphaltic concrete pavement, which at a special meeting of the council, was rejected as not being up to the standard called for in the contract. The council's action was based on the advice of the city's engineers, Bruce & Standeven, consulting engineers. The top of the pavement is cracked in places very badly and the engineers claim that an inferior sort of asphalt was used, making it too brittle. Mr. Demarest, representing the paving company, stated that he would at once begin action in the district court to have the issue determined.

Convict Road Building Experiment.

Baltimore, Md.—A detail of convicts—eighteen in number—have been taken out of the Maryland penitentiary and put to work on state road maintenance in Baltimore County. This is the first time that prisoners from the penitentiary have been employed on outside work since 1812 or 1814, when they were used in the construction of the Reisterstown pike and on the city docks. Those taken out are all men whose terms have nearly expired, so that chances of attempted escape are reduced to a minimum. Two guards were taken along, and at the end of each day the men will be returned to the prison for safekeeping. If the experiment works well other gangs will be taken out from the penitentiary and the house of correction. The prisoners are reported to be well satisfied with their lot in being taken away from the institution to new surroundings. Each prisoner receives a wage of 50 cents daily for his work for the state, and sufficient food is provided until he is returned to Baltimore at night. The location of the scene of work is being withheld by the board of prison control and the state roads commission, in order to prevent visits by curiosity seekers and to prevent any of the regular road gangs from being mistaken for convicts.

More Than 3,500,000 Motor Cars in United States.

Washington, D. C.—In 1916 there were 1,067,332 more motor cars registered in the United States than in 1915. This was an increase of 43 per cent. The gross total of registered cars, including commercial cars, was 3,512,996;

the number of motor cycles registered was 250,820. The several states collected in registration and license fees, including those of chauffeurs and operators, a total gross revenue of $25,865,369.75. Of this amount 92 per cent or $23,910,811, was applied directly to construction, improvement or maintenance of the public roads in 43 states, according to figures compiled by the office of public roads of the United States Department of Agriculture, in circular 73, "Automibile Registrations, Licenses and Revenues in the United States, 1916." The figures for 1916 correspond very closely with the annual percentage increase of motor-registration of the last three years. This yearly increase has averaged 40 per cent in the number of cars and 50 per cent in revenues. When viewed over a period of years, the increase in motor car registration and gross revenue has been remarkable. In 1906 the total state registrations were approximately 48,000 cars, on account of which the several states collected in fees and licenses a total gross revenue of about $190,000. Only a small part of this was applied to road work. In 1916 the $25,865,369.75 collected formed nearly 9 per cent of the total rural road and bridge revenues of the states. Recent years have shown an increasing tendency to put the spending of the motor car revenues directly in the hands of the state highway departments. Of the total amount applied to road work in 1916, 70 per cent, or $16,411,520, was expended more or less directly under the control or supervision of state highway departments. Only 13 states did not exercise any direct control over the expending of the net automobile revenues.

State Law Requires Bridge Railing.

Topeka, Kans.—The state highway commission has sent notices to the county and township officials that the law passed by the 1917 legislature relating to bridges requires that there be a bridge railing at the sides of every bridge and culvert. Some of the commissioners took this to mean that the railing required would be one which would stand a horse or even a motor car running into it. The attorney general and the highway commission have, however, assured them that the railing is merely to be there so that those who use the public highways may know when they are getting close to a bridge and how close they may drive to the side without a wheel dropping into the ditch. Two posts with a board or pipe connecting them, stretching the entire length of the bridge and all painted white are all that is required. In very few counties are the bridges as wide as the graded roads. In some places the bridges are 12 feet wide and the roads 20 feet. These bridges must all be widened to the width of the graded road, or the road grade reduced and railings must be placed along each side of the bridge. The law requires that the railings be painted white, too. This is to warn people at night and it is also required that the weeds be kept cleaned around all bridges so that the posts can be plainly seen at all times.

SEWERAGE AND SANITATION

New Sanitary Corps for Army.

Washington, D. C.—Secretary of War Baker has approved an order creating a sanitary corps under the medical department of the army which will include various classes of experts in sanitation, bacteriology, sanitary engineering, and men skilled in the supply, transportation, storage, etc., in connection with medical department work. The creation of this corps will make possible taking over intact hospital and ambulance units already organized in France which, under the law, can not be incorporated in the medical corps, to which the law authorizes the appointment only of graduates in medicine. It will also make it possible for the medical corps to make use of other trained men not graduates in medicine. Surgeon general Gorgas pointed out the pressing need of a sanitary corps. The total number of officers in corps may be approximately equal to, but not exceed, 1 for every 1,000 of the total strength of the military forces authorized from time to time pursuant to law. "The officers of corps will be provided by assigning officers of the Medical Reserve Corps thereto, or by the appointment of citizens of the United States who are found under regulations established by the secretary of war to possess special skill in sanitation, in sanitary engineering, in bacteriology or other sciences related to sanitation and preventive medicine, or who possess other knowledge of special advantage to the medical department. There shall be no grade in the sanitary corps above that of major and no officer of the medical corps shall be appointed in the sanitary corps. The number in the several authorized grades of the sanitary corps shall be proportional to the number authorized by law for the corresponding grades of the medical corps."

Appointment of a medical advisory committee, composed of leading sanitarians and public health authorities of the country, to advise the Red Cross in dealing with problems of sanitation and public health arising from war conditions, has been announced by the war council of the American Red Cross. It also was announced that establishment of dispensaries in all important seaports of the Allied countries probably will be one of the first undertakings of the Red Cross in administering the big war fund. The membership of the medical advisory committee includes: Dr. Simon Flexner, director of the Rockefeller Institute, chairman; Dr. John W. Kerr, assistant surgeon general, United States public health service; Dr. Herman M. Biggs, director of the New York state department of health; Dr. William H. Welch, dean of the school of hygiene, Johns Hopkins university; Dr. Frank S. Billings, professor of medicine, University of Chicago; Dr. M. J. Rosenau, professor of preventive medicine, Harvard university; Wickliffe Rose, director of the International Health Board; Dr. Victor C. Vaughan, professor of hygiene, University of Michigan; Dr. Charles V. Chapin, department of health, Providence; Dr. Richard P. Strong, professor of tropical medicine, Harvard university; Dr. Richard M. Pearce, professor of research medicine, University of Pennsylvania; ex-officio members, Colonel Jefferson R. Kean, director general, Department of military relief; Dr. T. W. Richards, assistant director general, department of military relief. Permanent offices for the committee will be opened in Red Cross headquarters here, in charge of Professor Pearce, who will act as secretary. The chief sphere of work of the committee will be in connection with plans of the war council for relief in Europe. A Red Cross commission is now studying conditions in France and other allied countries, and two of the main problems confronting this commission—tuberculosis and the spread of children's diseases in France—will engage the attention of the medical advisory committee.

Progress of Passaic Valley Sewer.

Newark, N. J.—Accepting the bid of Charles S. Haskin, of Boston, for the completion of the outfall pressure tunnel under Jersey City and New York Bay, the Passaic Valley sewerage commissioners awarded him the contract at $1,900,000, thus taking the first steps for the completion of the largest remaining link in the trunk sewer. Haskin's original bid was $2,391,000, which was the lowest of five bids received a few weeks ago. This, however, was nearly $300,000 more than the commission was ready to pay until more funds are available. After conferences with the engineers and contractors, it was agreed not to include certain sections of the work in this contract, including a 1,000-foot section of tunnel and terminal chambers. On the remaining sections the bid of Haskin was still the lowest and the contract accordingly awarded to him. The work called for in this contract is that originally undertaken by the O'Rourke Engineering Construction Company of New York, which obtained the contract for the entire section on a bid of $1,796,000, and abandoned it because of difficulties and disagreement with the commission. The contract with Haskin calls for air pressure work, whereas the O'Rourke contract called for free air work. This change accounts for much of the difference between the two prices. Increased cost of materials accounts for the rest. The Boston contractor has done considerable other work for the commission.

The members of the commission recently made their annual inspection and found work on the system which will serve Newark and Passaic Valley municipalities going for-

ward at a satisfactory rate, despite delays caused by labor shortage and the rise in the cost of materials. The work is more than seventy-five per cent completed, with indications that the system will be ready for use by December 31, 1918. The trip was the first general inspection in six months, and during that period much progress has been made on the $1,000,000 pumping station on the meadows, south of Doremus avenue and west of Avenue R. The building where the sewage will undergo a purifying process is 270 feet long and eighty feet wide, and is rapidly taking shape. Most of the brick work is completed. The tunnel under Newark Bay, extending from the Newark waterfront to the shaft terminal on the Bayonne side, has been completed since the previous inspection, and John F. Shanley, Jr., of Newark, the contractor, is removing his equipment. The great concrete pipes which will be placed at the end of the outfall tunnel in New York Bay have all been completed at Packard's wharf in Bayonne. The main sewer through the Passaic valley, ending at the Newark Bay pumping station, has been completed for some time. This is twenty-one miles in length. From the pumping station to the point of discharge, five miles, work is partly completed. There will be about thirteen miles of branch sewers reaching municipalities in the Passaic valley, making the entire system, when completed, about thirty-nine miles in length. The pumping station will have a capacity of 300,000,000 gallons a day, but is expected to handle only 120,000,000 at the outset. Four centrifugal pumps are to be installed, three for use at the beginning and one to meet demands as they increase. The pumping pits are fifty feet deep, and the pump casings are to be twenty-three feet in diameter. A battery of nine boilers, each 250 horsepower, is now being installed. The tunnel under Newark Bay, recently completed at a cost of $1,466,000, is at a depth of 250 feet, rising 170 feet on the Bayonne side and then proceeding at a depth of eighty feet. It was decided cheaper and safer to go down 250 feet and drill through solid rock than attempt to construct a tunnel nearer the surface. Evidence of the increase in the cost of supplies is shown by the fact that steel rails, for which the contractor, John F. Shanley, Jr., paid $18 a ton two years ago, have been sold for $70 a ton. A dynamo which he bought second hand two years ago was sold for twice what a new one would have cost when he bought this one. The price he received for rails is above the present market price, because he is delivering them at once. Steel rails bought now in the regular market are not likely to be delivered for two years. The latest estimate places the cost of the system at $13,500,000. The estimate when the work was undertaken five years ago, was $11,250,000.

Typhoid Epidemic in Village.

Bath, Mich.—This village, located in Clinton county, has been the subject of attention of the state health authorities, especially the engineering department of the state board of health. In the month of June there were 37 cases of typhoid. The total population is but 300. State sanitary engineer Rich sent experts from Lansing to work trying to locate the source of infection.

Ohio State Health Board Reorganized.

Columbus, O.—The state board of health, consisting of seven members, created 31 years ago, passed out of existence when the new law creating a state department of health became effective. Hereafter health affairs will be controlled by a public health council of five members. The governor appoints four and they select a state commissioner of health, who is the fifth member. He is also the chief executive officer, taking over all the administrative duties of the old board and its secretary. He must be a physician, skilled in sanitary science and must give his full time services. He will receive $5,000 a year. The other members get $10 a day when in conference. Because the old board could not get along harmoniously, the legislature decided to abolish the board and create a new department. The old board was without secretary for more than a year because of a deadlock. The commissioner of health is authorized to pass upon propositions coming before the department for approval without holding them up to await monthly meetings as heretofore. From a one-man institution, 31 years ago, the health department has developed into a branch of the state government with eight divisions and 65 employes. The appropriations have increased from $5,000 to $128,000. The present chief executive is James E. Bauman, who has practically "grown up" with the department and is expected to be retained as deputy commissioner. He has been at work twenty-five years. The only surviving member of the original board of health is Dr. T. Clark Miller, present health officer of Massillon.

WATER SUPPLY

Progress on Hetch-Hetchy Project.

San Francisco, Cal.—City engineer O'Shaughnessy has returned after a four days' tour of inspection of the Hetch-Hetchy project. He reports that diamond drilling has revealed the fact that Hetch-Hetchy valley was originally a mountain lake which has, for a long period of time, become filled with gravel and detritus. The drilling has been done to show the depth of gravel and loose rock, twenty holes having been made from the main dam site to a point about 134 feet upstream. The deposit at the dam site is seventy-four feet deep, while at the upstream point, it is 150 feet deep. Drilling was stopped at bed rock. O'Shaughnessy reports work progressing in a very satisfactory manner. Track is laid on the railway project as far as Hamilton's station, a length of thirty-nine miles from Rosasco to the junction with the Sierra Railway of California. About twenty-five miles of track remains to be laid to reach the dam site at Hetch-Hetchy, which should be completed by September 1. Four locomotives are employed on this feature of the big job. About 125 men are employed by the contractor. The right-of-way for the aqueduct line has been obtained from Early intake on the Tuolumne river to Priest's, and adits have been opened up all along the route at each working point so that the character of the material to be encountered is exposed. Diamond drilling has been done here also, so that prospective bidders may know the character of ground along the right-of-way. In the gorge at South Fork a special branch road had to be made down to the opening of the longest tunnel, which has taken about three months to construct. As the city intends to distribute power to contracors working in adits, a pole to transmit current will have to be erected. The final plans have been developed for the main dam structure and it is expected that the city will soon be in a position to call for bids for the dam and nineteen miles of aqueduct. The board of public works has filed with the clerk of the board of supervisors a request that the right-of-way agreement between the city and the Yosemite Power Company be finally approved. The agreement is made for the construction of the Hetch-Hetchy Transportation Railway over the Golden Rock ditch and the Keystone ditch. The city is required only to maintain concrete culverts over the crossings.

The Meter Controversy in New York City.

New York, N. Y.—The board of aldermen has shelved the ordinance recently requested by commissioner William Williams of the department of Water Supply, Gas and Electricity, proposing to install meters in all apartment houses in the city having passenger elevators. The decision followed very exciting public hearings and the loud protests of some real estate men and tenants were apparently convincing. Commissioner Williams fought hard for the measure. There was widespread fear that the metering plan would be extended to all homes. The reasons of the committee of aldermen were that metering would restrict the free use of water by the poor and thus lead to uncleanliness and disease. It quoted a letter from the late mayor Gaynor written in 1911 which read: "I do not believe in charging for water according to meter for domestic purposes or for use in dwellings and tenements. If heads of houses had to pay for water according to meter they would be uneasy when their wives and children took baths, for such is human nature. The result would be discomfort and uncleanliness. Everyone would hesitate to

take a bath sooner than add to the household expense. This would be particularly so among the poor and people of moderate means. I believe in getting an inexhaustible supply and let everyone use all the water he or she wants for washing and bathing and domestic purposes." The committee added the following point: "Vicious tenants would take advantage of their landlord for any petty and malicious grievance by allowing the water to run continuously, and, incidentally, the supply of water would be wasted." Commissioner Williams, in a letter to the board, points out that poor people do not live in apartment houses with elevators. Following conferences with the Advisory Council of Real Estate Interests, commissioner Williams framed an amendment to meet the objection of wilful waste by tenants. This section says: "Wilful waste of water prohibited—No person shall open, hold open, or fasten open, or damage, or tamper with any piping or water fixtures connected with the municipal water supply, or with the public water supply, within the city of New York, of any private water company, or cause any such piping or water fixture to be opened, or held or fastened open, or damaged, or tampered with, for the purpose of wasting water or interfering with the supply of water to other persons, or of defrauding or injuring the city or any private water company or any person responsible for the payment of water rates or water rents pertaining to the water so wasted. Any person who shall violate any of the provisions of this section shall, upon conviction thereof, be punished by a fine of not more than $25, or by imprisonment for not exceeding thirty days, or by both such fine and imprisonment." In his letter commissioner Williams stated that there are 2,063 apartment houses in the city which would be affected, many of which were at one time fully metered. He points out that the department will need additional revenue following the assumption of carrying charges on the debt for the new Catskill supply and that the proposed metering would bring in about $600,000 a year. The cost of metering is estimated at about $320,000 and the cost of maintenance about $7,000 a year. Cost of meter reading and clerical work would be less than under the present flat rate system which requires elaborate periodic inspection of fixtures and interiors and which is impracticable to devise properly. It is to be the policy of the city to acquire the meters now owned by the property owners, and the city will likewise assume all work of installing, maintaining and renewing meters on the municipal service. This will be done entirely independent of the further extension of the meter system itself. Annual service charges will be then established to apply to the metered premises for the purpose of covering the average cost to the department of installing and maintaining the meters. It is also the purpose of the department to establish minimum charges on metered service for the double purpose of insuring sufficient minimum revenue to the city from premises where consumption is very small, and, on the other hand, for insuring an adequate supply of water for domestic purposes in multiple family houses under the minimum charge.

STREET LIGHTING AND POWER

City Plant May Sell Current Below Cost.

Columbus, O.—The Columbus municipal light plant must establish a uniform schedule of rates which will not discriminate between consumers in the same locality. The plant, however, is not barred from selling light and power below cost. These are the two main features of a recent decision by the Ohio supreme court. The decision is statewide, laying down the same principles to all municipal plants in the state. It is the result of a suit by James M. Butler, Columbus taxpayer, brought March 14, 1913, against mayor Karb, the light plant superintendent here and other city officials to enjoin the light plant from making new contracts for sale of electricity. Butler charged the municipal plant and the city were selling "day load" light and power to private consumers below cost; that the contract rates would not pay the interest on bonds for the plant and that taxpayers at large were therefore called upon to make up the deficit; that the sale of current to private consumers so overloaded the plant that it was being damaged and streets could not be lighted properly; that the city had failed to adopt a uniform rate schedule with the result that some consumers were paying more than others in the same locality which means "discrimination." Council recently passed an ordinance fixing uniform rate schedules for current sales from the plant.

Plant Burns During Sale Negotiations.

Williams, Ariz.—Fire from an unknown cause recently entirely destroyed the electric light and water plant at this place and left the town without lighting facilities except such as could be provided by the small private plant of a lumber company. Mayor Reid telephoned to F. A. Jones, chairman of the state corporation commission. The state corporation commission had been making an inventory of the Williams electric light and water plant to ascertain its physical value. This was started two months ago at the instance of the city of Williams which had complained of the service and was with a view of bonding the city to purchase the plant from the Chicago owners. An agreement had practically been reached as to the price at which the plant would be transferred.

Cities Unite to Fight Lower Gas Standards.

Trenton, N. J.—The League of New Jersey Municipalities and a number of individual cities have joined forces to oppose the proposed reduction of the required heating standard of gas from 600-550 B. t. u. to 550-525 units. The cities won a preliminary skirmish when the board of public utility commissioners postponed continuation of hearings until July 16 so that the cities could examine the testimony and get expert advice. Spaulding Frazer acted as counsel for Newark and Judge Francis Scott for Paterson. The Public Service Gas Company and about a score of independent companies fought the delay. Theodore Grayson, represented twelve of the smaller companies, contended that the heating standards exacted by the board is considerably higher than standards required of utility companies in neighboring states. Under the rule of the New Jersey commission, he said, companies must maintain a monthly average total heating value of not less than 600 British thermal units, with a minimum at no time falling below 550 thermal units. Instead of this prevailing standard, Mr. Grayson submitted, the maximum should be fixed at 550 thermal units and the minimum at 525 units. In submitting the case for the Public Service Gas Company, L. D. H. Gilmour said that as a result of the testimony the board might conclude that the rate should be increased and the heating standards lowered as well. He predicted that in the near future it will be necessary to use the lower grade coal which, he submitted, will not produce the standards required by the board. By-products used in the manufacture of gas, Mr. Gilmour contended, are in great demand by the United States Government because of the war. This, he said, will greatly increase the cost.

The first witness to be called by Mr. Gilmour was president Albert E. Forstall of the American Gas Institute. Mr. Forstall said the standard in operation was not fixed as the result of any investigation and expressed the belief that the difference between 600 and 500 British thermal units is not material from the viewpoint of the consumer. He said the standard maintained now is not advantageous to the consumer. John J. Kemp of Philadelphia, an engineer of the United Gas Improvement Company of that city, witness for the company, expressed the belief that consumers would benefit ultimately by a reduction of the present heating standards which would minimize the effect of carbohydrates on mantles, which are generally in use. He thought a lower heating unit would reduce the freezing up of pipes and consequently result in less cause for complaint. R. F. Pierce, engineer of the Welsbach Company of Massachusetts, testified that air adjustments on mantles are not required when the heating standard is below 550 British thermal units, but that much air is needed to burn soluble hydro-carbons, which are present when the heating standard is increased. That the normal cost of production of gas has not existed since 1915 was the substance of testimony given by Carl Geist, manager of the Atlantic City Gas Company. Mr. Geist

said the increase in cost of material for 1916 over the previous year was almost six cents a 1,000 cubic feet. If present market prices continue, he said, this cost will increase to fifteen cents. The cost of coal used by this company, he said, had shown an increase of $5,000 for bituminous and $7,000 for anthracite for the year. If permitted to maintain a lower heating standard than that prescribed now, Mr. Geist said his company could save approximately $10,250. George L. Record organized the cities for the fight, and warned that they would lose all they gained in the famous 90-cent fight, which he also conducted. He said: "If the gas companies are allowed to lower their standard, they would be able to eliminate from the gas certain valuable chemical elements which would be available for the manufacture of explosives in making munitions as a by-product. It will result in supplying gas to consumers of a quality so much inferior to that now supplied as will require the consumption of additional gas in order to obtain the present results, of from ten to twenty-five per cent. The cost of making this gas will be at least ten per cent. less than the cost of the present quality. As the gross receipts of the gas companies of the state aggregate some twelve million dollars, this means a minimum additional exaction from our people of over one million dollars, and possibly twice that amount, and an equivalent saving to the companies." A reduction of fifty heating units, as called for in the pending application, it is estimated, would mean an addition of 8.3 per cent. to the existing bills for all gas used for cooking, for water heating and for power purposes. Gas for the purposes mentioned would therefore cost under the proposed plan, in territory served by the Public Service, about ninety-seven and a half cents per thousand cubic feet, as against the present ninety-cent rate, thus nearly wiping out all that was gained by the long contest in the Passaic gas rate fight.

FIRE AND POLICE

No Fire Protection Outside City Limits.

San Antonio, Tex.—Financial assistance from the board of county commissioners toward establishing fire protection for residents of additions lying beyond the corporate limits of San Antonio will not be forthcoming, because funds for this purpose are not available. This means, in all probability, that property owners of a score of additions lying outside of the city limits will be compelled to provide individual protection against fire. Announcement by mayor Bell that the fire department would cease to respond to alarms of fire beyond the city limits, has caused much concern among property owners in the various additions. Acting chief Goetz announced that instructions given the department provide for runs beyond the city limits only in a few instances, these including a fire at several institutions situated beyond the limits, where loss of life might result by reason of a fire. Investigation shows that some additions of the city, previously announced as lying beyond the city limits, are within the boundaries and therefore will be given protection against fire by the city department. These include Palm Heights, West End, Keystone Park, College Heights, Grand View, Sunny Slope, Three's Addition and Edgewood. Additions affected by the order include Alamo Heights, Los Angeles Heights, Montclair, Madeleine Terrace, Washington Heights and Harlandale, Crestholme and Graves End. The extreme ends of Sunset Place, City View addition and Lakeview will also be affected.

Merit System for Houston Policemen.

Houston, Tex.—The members of the police force of the city are to be marked according to a detailed and rigorous merit system on their general efficiency and conduct. If they fall below 65 they will have charges made against them before the civil service commission for inefficiency. The monthly record of each man will be kept. If his percentage is between 86 and 100, he will be marked "excellent, with a special letter of commendation to the commission;" 84 to 85 is excellent; 82 to 83 is good; 80 to 81 is fair; 78 to 79 is moderate; 75 to 77 is rather poor; 70 to 74 is poor; 65 to 69 is very poor, and below 65 means charges before the civil service commission. Five demerits will take 1 per cent. off a policeman's general standing. All the policemen will first be given a standing by their commanding officer. They will be rated at about what he considers has been their past efficiency as officers. Then it will be up to them to raise or lower that standard. For instance, if a policeman is sick and doesn't report within two hours after his time to go on duty, it will get him 10 demerits, or cost him 2 per cent. in his monthly average. If he is on sick leave for 15 days it costs him two demerits, and three demerits for each day after that for the month. For each day he is off on his vacation he will get one demerit, and when absent with leave two for each day for the first two days and three for each day thereafter. So if a policeman wants his vacation without working an injury to his record he has got to have a high standing for himself. Merits will be given for especially good service, like stopping a runaway, preventing crime, making a "good catch," turning in a reward to the sick benefit fund and many other things. A very detailed system of merits and demerits is being worked out, so that every official act of a policeman will entitle him to either credit or discredit on his standing. However, it is announced no merits will be given for perfect attendance, because that is expected of a policeman while he draws pay. The fact, however, that he can always be depended on to be on the job will be considered by his commanding officer in rating him as 80 per cent. efficient, or 85 or 100 per cent. efficient, whatever it is. For violations of police rules, or conduct unbecoming an officer or rudeness to the public very heavy penalties will be imposed.

Firemen Cross Mexican Border.

Juarez, Mexico—An American fire company a few days ago crossed into Mexico and put out a fire which had gotten beyond control. As Juarez has no organized fire department, the mayor appealed to El Paso for help. An automobile hose company responded, being the first fire company to cross the border to Juarez in three years. The loss was estimated at $100,000 gold.

GOVERNMENT AND FINANCE

Ten Year's Work of Public Service Commission.

New York, N. Y.—The Public Service Commission is now ten years old, the law creating it having gone into effect on July 1, 1907. In all save one state of the Union there are today regulative commissions, many of them founded upon the same lines as those of the New York commission, but differing from it in that they have no local rapid transit powers such as are possessed by the Public Service Commission of the First District. Under its rapid transit powers the commission is constructing the great dual system of rapid transit, involving the expenditure of between $350,000,000 and $400,000,000, about half of which is being contributed by the city of New York. Under its regulatory powers generally, and partly as the laws have been changed to broaden its scope, it has exercised jurisdiction over stock and bond issues of corporations, has accomplished reductions in rates charged for gas and electricity, has eliminated many dangerous grade crossings, has improved the installation and equipment of the various companies under its control and has effected a saving of human life by the enforcement of safety precautions and the installation of safety devices. It has handled many thousands of complaints from the patrons of public utilities and has settled a great portion of these really justified to the satisfaction of the complainants.

The construction of the new rapid transit system has been described as the greatest single municipal transportation achievement in America. At the time of the creation of the commission the old subway, then in operation three years, and the elevated lines both in Manhattan and Brooklyn were rapidly becoing congested to an extreme point and early relief was seen to be necessary. The old Board of Rapid Transit Commissioners, predecessors of the Public Service Commission, left office with some new rapid transit work in course of construction, notably the Centre street loop. The commssion took over the uncompleted work, finished it and began the construction of the Fourth Avenue subway, in Brooklyn, and of the Broadway-Lexington Avenue subway, in Manhattan and the Bronx, previous to the signing of the dual contracts.

The Dual System contracts were signed on March 19, 1913, and cover fifty-three miles of new rapid transit railroad to be operated by the Interborough, with a total length of line of 115 miles. Under the contract with the New York Municipal Railway Corporation of Brooklyn, the operating company for the Brooklyn Rapid Transit, there will be in all about thirty-six miles of new railroad to be operated by that company, with a total length of line of ninety-nine miles.

It is expected there will be in operation about eighty-one road miles of new rapid transit lines out of a total of 109 road miles of new lines in the system by the end of 1917. There will have been expended approximately $325,000,000 up to that time.

Including the third-tracking of the elevated lines, the new rapid transit system will add 345 track miles to the existing rapid transit mileage, and will give New York more than 600 miles of such lines—more than is possessed by any other city in the world.

The regulatory work of the commission has covered a broad field. When the commission came into office the surface car lines, particularly of Manhattan and The Bronx, were on the verge of receiverships. The Interborough-Metropolitan investigation led to the lines of that corporation being placed in receivership, and later to their reorganization on new bases. At the time of the receivership breakdowns in service were frequent, accidents were common, and service generally was in a disorganized and chaotic condition. Today the number of street car accidents has been greatly reduced, due largely to safety equipment installed pursuant to orders by the commission. One important feature of the commission's work has been its oversight of the capitalization of light, heat, power and transportation companies. The applications for approval of proposed issues in 1917 amounted to $836,358,157, of which the commission permitted the issue of $651,967,477. A material reduction in rates for gas and electricity has been effected. At the creation of the commission the maximum rate of the New York Edison Company was 10 cents a kilowatt hour for electricity. By successive reductions this rate has dropped to 7 cents, which recently went into effect. The maximum rate of the Edison Company of Brooklyn in 1907 was 12 cents, which has been reduced to 8 cents.

Valuation of City Property.

Springfield, Mass.—An accurate census of city property and valuations is now available for the first time in over four years, the city realty committee having reported to the city council. This shows that the land and buildings owned by the city are valued at $13,292,846.81. In past years the city realty committee has made a rather perfunctory report of little value. Chairman Nelson W. Haskell of this year's committee decided that a thorough report should be made. Serving with him on the committee are alderman Lester, councilmen Beth, Doyle and Smith. Valuations will be shown in the statement as follows:

Water department land and buildings $206,560.14. On the Little River system the land and buildings are worth, according to assessed valuations in the towns where located, $56,100.67; the Ludlow system, $23,259.47; and in the city of Springfield, $127,200. Under the city property committee's control are buildings valued at $3,547,300.99 and land worth $1,346,492.68. The estimated valuation of the Municipal Group and land is $3,300,000. The police department land and buildings, including that in Indian Orchard, are valued at $179,500. The estimate for the street and engineering department shows land and salable land worth $280,543, and buildings worth $118,700, a total of $399,243. The salable land is strips here and there throughout the city acquired by the city, but not used, in street improvements. The charities department shows the land and buildings on the almshouse site worth $196,300.

The health department owns on State street a tract of land valued at $11,000, and on West street, the so-called West street dump and a part of the land now used as the league baseball park. The value of the last named land is $30,000, making this department's total land value $41,000. Land owned by the park department throughout the city is worth $3,521,500, and buildings, $69,950. This gives the department a total of $3,591,450. The fire department's land is worth $75,800, and the buildings are valued at $409,200, a total for both of $485,000.

Municipal Utilities Profits in English City.

Huddersfield, England.—The Huddersfield council's revenue statements for the past fiscal year show an income from the waterworks of £100,340 ($488,304) and expenditures, including interest on construction bonds, of £98,775 ($480,688), leaving a surplus of £1,565 ($7,616). The receipts of the municipal gas plant were £147,205 ($716,373) and expenditures £139,215 ($677,489), a surplus of £7,990 ($38,884). Improvements to be made soon include a dining hall to accommodate the large number of female employees. The tramway system yielded a revenue for the year of £152,436 ($741,829) and the operating expenses were £90,749 ($441,630). The number of miles run was 2,829,545; the income about 25 cents per car-mile, and the expenses nearly 15 cents per car-mile. This system serves about 160,000 people, and 2,000,000 more passengers were carried than in the previous year.

TRAFFIC AND TRANSPORTATION

City Must Share Grade Crossing Elimination Costs.

San Jose, Cal.—Practically the last obstacle toward the construction of the proposed viaduct railroad crossing over the Alameda, and, in connection, the building of the new West San Jose depot, was removed when the supreme court of California upheld the power of the state railroad commission to require a city to bear part of the cost of making a separation of grades at a railroad crossing. In the decision written by justice Harry Melvin, attention was called to the fact that San Jose voted to the railroad commission the city's powers of regulating public utilities. For this reason the court held that the provisions of the public utilities act empowering the railroad commission to direct the separation of grades at railroad crossings, and to divide the cost between the railroad and the city, were applicable within San Jose. As a result of the controversy between the city of San Jose and the company respecting the matter of paying for the required grade at the crossings in the vicinity of the West San Jose depot, the council at that time decided to leave the matter entirely with state railroad commission, which decided in accordance with the findings of the supreme court. City Attorney Lamb said that the commission ruled that the city would be required to pay 35 per cent of the cost of separation of grades, the county 15 per cent and the Southern Pacific the remainder. The separation of grades on the Alameda will cost about $350,000. City manager Reed said that San Jose contended that the commission had no jurisdiction toward compelling a city to pay for the improvements of any railroad, and hinted that the matter might be further contested.

Uniform Traffic Regulations for State.

Albany, N. Y.—Traffic regulations throughout the state are made uniform for the first time by governor Whitman's recent signing of the Welsh traffic act. The Welsh bill was drawn up by the conference of mayors and other city officials of the state. It was amended many times during its travels through the legislature, but in its present form it regulates traffic of all vehicles and street surface cars. It prescribes definitely the right of pedestrians and vehicles and contains provisions for the safety of various vehicular traffic and for the suppression of unnecessary noise. Local authorities are given power only to make and enforce ordinances and regulations regarding traffic that special local conditions may make necessary. Some of the more important prohibitions are:

No vehicle and no street surface car shall be driven through a procession, except with the permission or by order of a police officer. If the procession takes more than five minutes to pass it shall be broken and traffic allowed to go through.

Driving within a safety zone is prohibited.

No vehicle shall emerge from an alley, stable, garage or driveway except slowly and under control of the driver who shall give a proper warning by voice or signalling device to passing vehicles and pedestrians.

Use of muffler cut-out on any highway within the limits of the city or incorporated village is barred.

Gong and siren whistles shall not be used on any vehicle other than ambulances and vehicles operated by a police department, fire department, sheriff, authorized public utility company when on emergency calls and the United States mail and military services.

Except in an emergency or when advised to do so by a police officer, no vehicle shall be stopped or left standing within the intersection of any cross street; within 10 feet of any crosswalk or street crossing or alley corner, except where traffic officers are on duty; within 10 feet of any fire hydrant unless the vehicle is actually in charge of some person capable of driving it; in such position as to prevent another vehicle already stopped near the curb from moving away; in front of or within 15 feet of either side of the entrance to any theater, auditorium, or other building where large assemblages of persons are being held, except to take on or discharge passengers or freight and then only for such length of time as is necessary for such purpose; in any portion of any street where street surface cars stop to receive or discharge passengers, except as otherwise provided.

No vehicle shall be stopped in any street close to the curb thereof, unless in case of emergency or to allow another vehicle, street surface car or pedestrian to cross its path. This regulation shall not be construed to prevent local officials designating portions of streets as parking spaces.

No vehicle may stop with its left side to the curb except in one-way streets.

A vehicle when loaded with any material extending at least four feet beyond its rear shall be provided with a red flag by day on the extreme end of such load.

It is unlawful to make any except absolutely necessary repairs in any street or public place.

A vehicle, unless confined to tracks, shall not tow more than one other vehicle, and the connection between the two shall not be longer than 16 feet. Each towed vehicle must have an attendant.

Street cars shall have the right of way over other vehicles at cross streets.

The driver of any vehicle proceeding upon the tracks in front of a street car shall turn out as soon as possible upon signal of the operator of the car.

No person shall drive or ride a motor vehicle, motorcycle or bicycle in any street without having a hand on the handle bars of steering device.

The driver of a two-wheeled motorcycle or a bicycle shall not carry any other persons thereon except on a seat securely fastened to the machine in the rear of the driver and provided with foot rests and hand grip.

No person shall coast with handsleds, bobs or carts or other vehicles on wheels or runners on any sidewalk in a city; nor in any street except such streets as may be designated by the common council, board of aldermen or commission of that city.

No motor vehicle shall be operated in such way as to emit unnecessary smoke or offensive vapors.

New York, N. Y.—Every owner of an automobile who drives his car in New York city has been required to take out an operator's license before July 1, according to the provisions of the Cromwell-Kelly bill signed recently by governor Whitman. The Safety First Society of New York, in commenting on the law, said: "Not only is the owner required to have an operator's license, but if his wife, daughter or son drives, she or he must also take out an operator's license. The card issued by the Secretary of State must be carried by the person operating the car." The law had its inception in agitation by the Safety First Society. It provides a quick means of identification for every motor vehicle operator, and confers upon the Secretary of State power to suspend or revoke the license of any operator for the following offenses: "A third or subsequent violation of the speed law. Conviction of a felony. Disability of the holder of a license by reason of intoxication or use of drugs. Gross negligence by the operator as a result of which person or property is injured. Going away without stopping and giving name and address after causing injury to any person or damage to any vehicle. Operating a motor vehicle in a manner showing a reckless disregard for the life or property of others." No examination is required by the law.

MISCELLANEOUS

Comprehensive Port Development for Portland.

Portland, Ore.—The recent voting by a large majority in favor of a $3,000,000 bond issue for a municipal grain elevator and additional dock and warehouse facilities marks a new important stage in the realization of the comprehensive plan for the development of the port of this city. Since the creation of the commission of public docks in 1910, the progressiveness of its members and the skill of its engineers have been responsible for striking improvements to the city's water terminal facilities. When the commission was created by charter amendment, the voters approved an issue of $2,500,000 for the construction of docks and other waterfront utilities. With the expenditure of this money the commission has now in operation three docks, with a total frontage of 2,505 feet, and two warehouses used for storage of a number of commodities. The planning of the new grain elevators followed careful investigation by the commission. Portland has for many years been the chief grain export port for the Pacific Northwest. With the completion of the Panama canal shipping methods are beginning to undergo a radical change. The usual custom of handling grain in transport for export and delivery to California ports has been by sacks. Now the wheat growers of the "Inland Empire" of Oregon, Washington and Idaho have taken steps to eliminate the use of sacks and to ship their wheat from point of production to tidewater in bulk, as is now almost universally the practice. Realizing that the new method will be permanent, the commission asked the voters for the $3,000,000 issue to provide facilities. The necessary plans are now being prepared and construction will be begun as soon as possible so that the port may be able to handle the 1918 grain crop in bulk. The proposed elevator will consist of a first unit of one million bushels, and the head or working house to be sufficiently large and to contain machinery necessary to permit a total capacity of two million bushels storage. The elevator will be of concrete and of strictly fireproof construction. The cost of the elevator itself, including the machinery and storage bins, is estimated to be $900,000.

In the recently published report of the commission for the past year, which is well illustrated with photographs and the latest navigation charts of the port, is given a review of the work and financial operation of the development. The completed improvements are as follows: A motorboat landing, of fireproof construction, with barge float and two waiting or rest rooms and public comfort stations; a second story addition to the landing provides permanent offices for the commission. Dock No. 1, a quay 955 feet long, 300 feet in two levels, covered with a transit shed 935 feet long and 100 feet wide; a slip 120 feet wide and 484 feet deep and an open dock also 484 feet long; a one-story warehouse 190 by 200 feet, and a one-story transit shed 330 by 176 feet. This forms a very compact terminal, adequately served by rail trackage facilities, at which 59 fifty-foot cars can be accommodated at one time, while the frontage and slip afford berthing for one 500-foot vessel and two 450-foot. Dock No. 2 is a two-level quay, 526 feet long, covered with a 100-foot transit shed with accommodations for 16 fifty-foot cars. Dock No. 3 is a quay 540 feet long and 50 feet deep, 100 feet in two levels—with a transit shed 440 feet long. The superstructures of the first and second docks are of heavy mill construction, supported on wooden pile foundations. For the expeditious and economical handling of cargo there have been installed cargo masts and four portable electric dock winches. At the first dock there is a three-ton freight elevator and at the second there are two such elevators. An electric conveyor, two 2-ton electric dock trucks, a twenty-ton locomotive crane and adjustable ramps facilitate freight handling by the most modern methods. A board consisting of the city engineer, the engineer of the commission, the secretary of the Fire Underwriters' Equitable Rating Bureau and the fire marshal has been investigating the proposed construction of fire stops at the waterfront.

The commission exercises jurisdiction over the whole 25 miles of waterfront, passing on all applications for structures and repairs. The expenditures on the ship channel from Portland to the sea have been about $3,950,000 by the United States and $4,250,000 by the Port of Portland. At the mouth of the Columbia River, the entrance depth is now forty feet at low water and the depth is thirty feet along the channel. The operating revenues of the three docks for the last fiscal year were, respectively, $25,624.48 $7,940.53 and $3,721.23, while the operating expenses were $11,927.95, $8,063.55 and $1,284.62. The total revenues, including $171,733.43 in taxes, were $215,870.71, while the surplus was $61,695.12. The commission of public docks consists of C. B. Moores, chairman; Ben Selling, vice-chairman; John H. Burgard, F. C. Knapp and A. H. Averill. The engineer and secretary is G. B. Hegardt, M. Am. Soc. C. E.

Tree Planting in Baltimore.

Baltimore, Md.—The Division of Forestry, under city forester R. B. Maxwell, has completed the planting work for the spring season. Shade trees, totalling 666, were planted on the city's footways, and 5,500 on the Loch Raven watershed. The planting done in the city is a portion of the primary tree planting plan of the division. The following shade trees were planted for property owners upon request, and at the standard charge of $4.00 per tree: oriental planes, 24; Norway maples, 10. To fill failures in all planting made to date 235 trees were required. This includes the failures in more than 5,000 young trees. The planting of abandoned farm lands on the Gunpowder watershed was continued, and the following stock was used: white pines, 35,000; red pines, 10,000; red oaks, 3,500; white ash, 3,500; sugar maples, 3,500—a total of 55,500 altogether. This makes a total of over 400,000 young trees planted on the watershed since the work was started.

THE MUNICIPAL INDEX

In Which Are Listed and Classified by Subjects All Articles Treating of Municipal Topics Which Have Appeared During the Past Month in the Leading Periodicals.

It is our purpose to give in the second issue of each month a list of all articles of any length or importance which have appeared in all the American periodicals and the leading English, French and German ones, dealing more or less directly with municipal matters. The index is kept up to date, and the month of literature covered each time will be brought up to within two or three days of publication. Our chief object in this is to keep our readers in touch with all the current literature on municipal matters. In furtherance of this we will furnish any of the articles listed in the index for the price named after each article, except that where an article is continued in two or three issues of the paper, the price given is for each of said issues. In addition to the titles where these are not sufficiently descriptive or where the article is of sufficient importance, a brief statement of its contents is added. The length also is given, and the name of the author when it is a contributed article.

ROADS AND PAVEMENTS.

Asphalt:

Concrete-Asphalt Roadways. Increasing weight of traffic is chief factor in destruction of roads. Concrete base necessary for permanent construction. 2 ills. 1,250 words. Municipal Journal. June 28. 10 cts.

Sheet Asphalt on Old Macadam Base. Practice in several cities. 2 ills. 1,000 words. Engineering and Contracting. June 6. 10 cts.

Cost of Operating Municipal Asphalt Plant at District of Columbia. 1,200 words. Engineering and Contracting. June 6. 10 cts.

Asssessments:

Fitting Street Assessments to a Hillside Town. Frontage, area, value, benefit or damage and correction for overassessments are factors used. By Leonard Hohl. 2 ills. 750 words. Engineering News-Record. June 14. 15 cts.

Bituminous:

The Maintenance of Bituminous Pavements. Description of special forms of bituminous road construction. Suggestions concerning the repair of bituminous pavements other than asphalt. 8 ills. 5,000 words. Municipal Engineering. June. 25 cts.

Bituminous Macadam Pavements Laid in 1916 and Proposed for 1917. 2½ pages. Municipal Engineering. June. 25 cts.

Bituminous Surfaces. Road oils and tars considered from the standpoint of their use with the maintenance of broken stone and gravel roads. From a paper by A. H. Blanchard. 2,500 words. Engineering and Contracting. June 6. 10 cts.

Brick:

Brick Road Job Furnishes Uncommon Cost Data. Itemized cost kept of the header construction and grout filling. 4 ills. 1,200 words. The Contractor. June 22. 10 cts.

Concrete:

Wear on Concrete Road Surfaces. The third of three articles. Effect of traffic on mortar and on aggregate particles. By C. B. McCullough. 8 ills. 2,000 words. Concrete. June. 20 cts.

Repairing Concrete Pavements. Methods recommended by the Portland Cement Association. 850 words. Municipal Journal. June 7. 10 cts.

Belt Method Employed on 49-foot Concrete Pavement. 2 ills. 200 words. Engineering and Contracting. June 6. 10 cts.

Construction:

Road Work in the Mexican Desert. A striking example of experience in road building and in the handling of road machinery and labor under most adverse conditions. By Capt. J. A. O'Connor, U. S. A. 4 ills. 4,000 words. The Surveyor. June 1. 40 cts.

Track Construction in Des Moines. Entire downtown track layout rebuilt without stopping traffic. Types of construction described. By W. L. Wilson. 9 ills. 1,200 words. Electric Railway Journal. June 2. 10 cts.

Michigan's Trunk Line System. By D. A. Thomas. 1 ill. 2,500 words. Good Roads. June 16. 10 cts.

Road Construction. From a paper by M. A. Lyons. 3,000 words. Western Municipal News. June. 15 cts.

Construction Work in New York State Highway Department in 1916. 1,500 words. Good Roads. June 9. 10 cts.

Street Improvement in Ontario. Department of Highways presents detailed report on paving work in 22 cities and 11 towns. 2 ills. 7 pages. The Canadian Engineer. June 28. 15 cts.

Old Concrete Foundation Furnishes Most of New Base in Street Widening. By Hans Helland, Jr. 3 ills. 400 words. Engineering News-Record. June 21. 15 cts.

Busy Street Repaved Without Stopping Street-Car Traffic. Recut granite block laid between rails and asphalt paving on each roadway. 1,000 words. Engineering News-Record. June 28. 15 cts.

Road Building in Alabama. By J. B. Converse, Asst. State Highway Engr. 6 ills. 2,200 words. Good Roads. June 30. 10 cts.

Convict Labor:

Convict Labor on State Road Work in Va. 4,000 words. Engineering and Contracting. June 6. 10 cts.

Design:

Grades and Alignment of Trunk Roads in Province of Quebec. 1,100 words. Engineering and Contracting. June 6. 10 cts.

Drainage:

Road Drainage. By A. H. Hinkle, Maintenance Engineer, Ohio State Highway Department. 3 ills. 2,000 words. Better Roads and Streets. June. 15 cts.

Earth:

Sand Clay and Top Soil Roads. Should they be built in southern Appalachian regions? Has the past winter proved them to be failures? By Jos. Hyde Pratt. 3 ills. 5,000 words. Southern Good Roads. June. 10 cts.

Foundations:

Bituminous Foundations for Sheet Asphalt surfaces. By L. Kirschbaum, Director, Chicago Paving Laboratory. 4 ills. 2,000 words. Engineering News-Record. June 21. 15 cts.

Gravel:

The Construction of Gravel Roads. From a paper by W. F. Canning, of the Ky. Dept. of Public Roads. 2 ills. 5,000 words. Better Roads and Streets. June. 15 cts.

Granite:

Durax Pavement Construction at Dayton, O. Methods and cost. 1 ill. 1,000 words. Engineering & Contracting. June 6. 10 cts.

Granite Block Pavement. From a paper by Wm. H. Connell. 1,800 words. The Canadian Engineer. June 7. 15 cts.

Legal:

Oklahoma Makes New Laws for Road Improvement. 2,000 words. Good Roads. June 23. 10 cts.

Paving Contracts. From a paper by W. Earl Weller. 2,800 words. Good Roads. June 23. 10 cts.

Amendments to California's Road Laws. 3,000 words. Good Roads. June 23. 10 cts.

South Carolina's Highway Department Law. 1,250 words. Good Roads. June 9. 10 cts.

Recent Highway Legislation in Maine. 2,500 words. Good Roads. June 9. 10 cts.

New and Amended Road Laws of Montana. 3,000 words. Good Roads. June 2. 10 cts.

Maintenance:

Earth and Gravel Road Maintenance. By A. McGillivray. 3,000 words. Western Municipal News. June. 15 cts.

Staffordshire Main Roads. Maintenance and patching work. Construction. By James Moncur, Co. Surveyor. 1,800 words. The Surveyor. May 25. 40 cts.

Oiling:

Surface Tarring in Hampshire. By W. J. Taylor, Co. Surveyor. 1,000 words. The Surveyor. June 1. 40 cts.

Miscellaneous:

Cost of Cobble Lined Gutter in Los Angeles County, California. 2 ills. 800 words. Engineering and Contracting. June 6. 10 cts.

Curb and Pavement Made Monolithic. Money saved and satisfaction given by integral curb. 5 ills. 1,000 words. Concrete. June. 20 cts.

Many Road Improvements in Yellowstone National Park. What the government has done to make the park accessible to motorists. 3 ills. 1,500 words. Southern Good Roads. June. 10 cts.

Road Building Records. Classification and record of layout and construction costs of highway work for the state road commission of Maryland. 1,250 words. Contracting. June. 20 cts.

Township Road Superintendents' Daily Report Sheet. 3 ills. 500 words. Better Roads and Streets. June. 15 cts.

Bond Issues as a Source of Revenue for Highway Improvement. 6 ills. 7,000 words. Better Roads and Streets. June. 15 cts.

The Importance of the Cheaper Types of Roads. 4 ills. 2,000 words. Good Roads. June 9. 10 cts.

Japanese Roads and Highway Bridges. Roads are generally narrow and not very smooth. By J. L. Harrison. 10 ills. 2,000 words. Engineering and Contracting. June 6. 10 cts.

Labor and Material Report Forms Used by Resident Engineers of Illinois Highway Commission. 2 ills. 800 words. Engineering and Contracting. June 6. 10 cts.

Improved Street System for St. Louis. Plans prepared by City Plan Commission. The principal aim is to provide more adequate facilities for traffic. Street width standards. Legislation necessary. By Andrew Linn Bostwick. 2 ills. 1,800 words. Municipal Journal. June 28. 10 cts.

Road Division Headquarters Re-arranged for Efficiency, Yard and building interior in Los Angeles county road system laid out for convenience and economy. 2 ills. 1,000 words. Engineering News-Record. June 21. 15 cts.

Effect of the War Upon 1917 Road Work. Results of inquiries concerning the effect of the war on road work in the several states. 3,000 words. Good Roads. June 2. 10 cts.

The Effect of the War Upon 1917 Road Work. Report from many of the states on the probable effect of the war on road work. 3,000 words. Good Roads. June 9. 10 cts.

Effect of the War on 1917 Road Work. Reports from State Highway Departments. 1,800 words. Good Roads. June 16. 10 cts.

Resurfacing:

Method of Resurfacing Old Macadam Road. Types of resurfacing. Extraordinary repairs; reconstruction. 1,500 words. Engineering and Contracting. June 6. 10 cts.

Traffic:

Traffic Regulations. From a paper by Henry J. Case. 3,000 words. Good Roads. June 30. 10 cts.

SEWERAGE, DRAINAGE AND SANITATION.

Activated Sludge:

Activated Sludge Experimental Work at Milwaukee. Influence of low temperatures not detrimental. Sludge can be converted into a profitable market fertilizer. Determination of best methods of diffusing air throughout the sewage. 2 ills. 3,500 words. The Canadian Engineer. June 14. 15 cts.

Milwaukee Air-Diffusion Studies in Activated Sludge. Large air-water interface must be exposed. Nozzles and mechanical beaters are eliminated and fine-bubble diffuser plates are most promising. By C. H. Nordell. 4 ills. 1,500 words. Engineering News-Record. June 28. 15 cts.

Recommend 50,000,000-Gallon Activated Sludge Plant. Committee of Chicago sanitary districts advises expanding preliminary plans to include entire district and the immediate construction and six months' trial operation of a 1,500,000-gallon single unit. 2,500 words. Engineering News-Record. June 21. 15 cts.

Concrete:

An All-Concrete Sewerage System. Sewer pipe, manholes and underdrains and sprinkler pipes for filters are all of

concrete. 3 ills. 800 words. The Cement Era. July. 20 cts.

Experience with Concrete Sewers. Facts and opinions of engineers of 32 cities as to relative merits and costs of monolithic concrete, concrete pipe and brick. 1,500 words. Municipal Journal. June 7. 10 cts.

Construction:

Driving a Small, Hard Rock Tunnel in New York. Heading excavated to full size. Concrete mixed by gravity in shafts and delivered in muck cars on single track. Combination arch forms handled by jacking cars. 1,500 words. Contracting. June. 20 cts.

Open Cut Sewer Cost Show Well Balanced Job. Long handle steam shovel makes high yardage in deep trench. 2 ills. 800 words. The Contractor. June 22. 10 cts.

Brick Laying Schedule Speeds Up Small Sewer Construction in Tunnel. 600 words. The Contractor. June 22. 10 cts.

Deep Open Ditch Costs Less Than Sheeted Trench for 30 inch Drain Pipe. Fast work gets pipe laid before soft banks cave in. 3 ills. 600 words. The Contractor. June 22. 10 cts.

Filters:

Photographs for Studying Filters. Ice forming on beds in winter indicates the area covered by spray and intensity of discharge at various points. 6 ills. 1,000 words. Municipal Journal. June 14. 10 cts.

Gas:

Explosive Gas in the West Side Tunnel Before and After the Explosion July 24, 1916. By W. J. German. 13 ills. 18 pages. Journal of the Cleveland Engineering Society. May. 50 cts.

Miscellaneous:

Some Sewerage Details in Calgary. Inlet for taking water on street grades. Catch basins and manholes made of precast concrete sections. Sewer grit chamber. 3 ills. 1,200 words. Municipal Journal. June 7. 10 cts.

New York Adopts Rules for Sewage Works and Outlet Design. Grit chambers, screens, sedimentation tanks, hydraulic grades and outlet locations are covered. 1,000 words. Engineering News-Record. June 21. 15 cts.

Measuring, Locating and Stopping Leaks on Sewer Contract. Pipes bared and aniline dye used to locate leaky joints. Cement-mortar collars applied. By R. B. Ray. 1,000 words. Engineering News-Record. June 21. 15 cts.

Sewering a Small Community. Petersburg, W. Va., constructs sewerage system. Largest pipe is 8-inch, but most is 4 and 6-inch. 1 ill. 750 words. Municipal Journal. June 14. 10 cts.

Imhoff Tank Royalties. War with Germany makes it illegal to pay royalties. 1,000 words. Municipal Journal. June 7. 10 cts.

Sanitation:

Sanitation in British Army Camps. Methods developed during the present war for collecting and destroying all kinds of refuse. 6 ills. 2,000 words. Municipal Journal. June 14. 10 cts. Combustible refuse disposed of by incineration. Obtaining and purifying water. Provisions for bathing. Infectious diseases. 4 ills. 1,500 words. Municipal Journal. June 28. 10 cts.

Military Sanitation. From a paper by Lieut.-Col. W. P. Chamberlain. 3,000 words. Journal of the Boston Society of Civil Engineers. June. 50 cts.

Treatment:

The Treatment of Sewage. Discussion of a paper by Bertram Blount. 2,500 words. The Surveyor. May 25. 40 cts.

Operating Results of Imhoff Tank Sewage Disposal Works at Fitchburg, Mass. 4,000 words. Engineering and Contracting. June 13. 10 cts.

Kitchener Sewage Disposal Works. City will have two complete disposal systems of different types. New 2-story type sedimentation tanks and spraying filters now being constructed at cost of $75,000. By Herbert Johnson. 9 ills. 2,500 words. The Canadian Engineer. June 21. 15 cts.

Rochester's Sewage Disposal Plant in Operation. 4,000 words. Municipal Engineering. June. 25 cts.

Septic Tanks Reconstructed as Imhoff Tanks at Columbus. The second of two articles. Special features of design and construction. New tanks built while half of old plant was kept in service. By J. J. Morgan. 3 ills. 1,500 words. Engineering News-Record. June 7. 15 cts.

WATER SUPPLY.

Connections:

Water Service Connections. Comparison of costs and life of iron and lead connections. From a paper by [illegible]. 1,600 words. Municipal Journal. June 28. 10 cts.

Construction:

Troubles in Constructing a 42-Inch Submerged Main. Cost details of steel and concrete. Steel riveted pipe bottom cast at test base. Description of the sand used for filling sections into place. From a paper by J. W. Saunders. 3 ills. 1,500 words. The Canadian Engineer. June 7. 15 cts.

Dams:

Grouting the Foundation of the Elephant Butte Dam. Upstream row of grouted holes and two downstream rows of drainage wells are as follows: By E. H. Baldwin. 3 ills. 2,500 words. Engineering News-Record. June 28. 15 cts.

Settlement Observed on Two Earth Dams in Porto Rico. By J. M. Sills. 2 ills. 1,000 words. Engineering News-Record. June 21. 15 cts.

Design:

The Design of a Tower for a 50,000-Gallon Hemispherical Bottom Tank. Stress sheets and notes on designs of columns, rods, bolts, struts and foundations. 3 ills. 1,300 words. The Canadian Engineer. June 14. 15 cts.

Failure of Hydraulic Projects from Lack of Water Prevented by Better Hydrology. More complete study of stream yield is first step. Low-flow frequency, degree of flashiness and dry weather evaporation can not be neglected. By R. E. Horton. 2,500 words. Engineering News-Record. June 7. 15 cts.

New Design of Screen Chamber. Detailed description of screen suitable for use in connection with water supply system. From a paper by John H. Lance. 4 ills. 1,500 words. The Canadian Engineer. June 21. 15 cts.

Reliability of Pumping Station Design From a paper by Clarence Goldsmith. 2,000 words. Fire and Water Engineering. June 13. 10 cts.

Meterage and Waste:

Leakage from Water Mains at Washington. 800 words. Engineering and Contracting. June 13. 10 cts.

Water Metering and Consumption in Springfield. Effect on consumption of 12 years' increase in metering. All private and some public services now metered. 1,750 words. Municipal Journal. June 14. 10 cts.

Miscellaneous:

Montreal Aqueduct Report. Second of two articles. Report says steam plant would have been better than enlargement. 7,000 words. The Canadian Engineer. June 7. 15 cts.

The Treasury Department Standard for Drinking Water, Its Value and Enforcement. By H. P. Letton. 1,000 words. Fire and Water Engineering. June 6. 10 cts.

Flow Through Sharp Edged V-Notches or Weirs. By E. W. Doubler and F. H. Rayfield. 7 ills. 2,500 words. The Cornell Civil Engineer. May. 25 cts.

The Relations of Water Supply to Disease. From a paper by F. L. Parker. 1,500 words. Fire and Water Engineering. May 30. 10 cts.

The Quality of Water and Confirmatory Tests for B. Coli. By Abel Wolman. 1,000 words. Fire and Water Engineering, May 30. 10 cts.

Service Charges—How Constituted. Report of committee of American Water Works Association. 3,000 words. Engineering and Contracting. June 13. 10 cts.

Chlorine Cell Installation of Montreal Water & Power Co. 2,000 words. Engineering and Contracting. June 13. 10 cts.

Cleaning Pipe Coated with Metallic Slime. 350 words. Engineering and Contracting. June 13. 10 cts.

Useful Life of Water Works Units. Data from report of Committee of American Water Works Association in regard to depreciation. 2,000 words. Engineering and Contracting. June 13. 10 cts.

Old Conduit Breaks Alongside Trench for New Conduit. Flow maintained by sand bag channel until new conduit could be constructed. 3 ills. 1,000 words. Engineering News-Record. June 7. 15 cts.

Water Works Property Exempt from Taxation. 1,000 words. Municipal Journal. June 14. 10 cts.

Experiments on Removal of Iron from Water Supply of Springfield, Ill. 8 ills [illegible]. June 13. 10 cts.

Laboratory for Small Water Works. 1,000 words. Municipal Journal. June 28. 10 cts.

Operation:

Operating Results at Plant for Removal of Iron and Manganese from Ground Water at Lowell, Mass. 1,600 words. Engineering and Contracting. June 13. 10 cts.

Practical Problems in Filtration Plant Operation and Their Solution. 1,500 words. From a paper by L. J. Birdsall, Engineering and Contracting. June 13. 10 cts.

Overcoming Practical Problems in Mechanical Water Filter Operation. From paper by L. J. Birdsall. 2,500 words. Engineering News-Record. June 14. 15 cts.

Pumping:

Pumping Station Cost and Efficiency Records. From a paper by Mark A. Hall. 1,000 words. Fire and Water Engineering. June 20. 10 cts.

Endurance-Efficiency Pump Tests. Data as to endurance and efficiency tests on four motor-driven, centrifugal, high pressure, fire service pumps. The method used to correct the over-registration of the discharge Venturi meter is given By L. A. Quayle. 6 ills. 2,000 words. Power. June 19. 5 cts.

Pumping in Metropolitan Water District of Massachusetts. From a paper by A. O. Doane. 5,000 words. The Canadian Engineer. June 14. 15 cts.

Duty Trials on Pumping Engines at Toronto. Details of conditions governing the trials and description of units and results. By R. W. Angus. 1 ill. 3,200 words. The Canadian Engineer. June 21. 15 cts.

Reservoirs:

Small Earth Reservoirs as an Adjunct to Electrically Operated Irrigation Pumping Plants. 1,000 words. Engineering and Contracting. June 13. 10 cts.

Trenching:

Trenching by Machine. 6-foot water main laid in trench 8 feet deep. Cost of excavation with machine was less than $1.00 a foot. 1 ill. 1,600 words. Municipal Journal. June 7. 10 cts.

Water Supply:

Recent Progress in Water Supply. Advance made in the past 10 years in improving quality. Improvements in pumping machinery. Consumption and metering. From a paper by John W. Alvord. 4,500 words. Municipal Journal. June 14. 10 cts.

STREET LIGHTING AND POWER.

Cooking:

Some New Aspects of Electric Cooking. Statistics showing the advantages and economies of electric cooking. By T. H. Kettle. 2 ills. 5,000 words. Electrical Review. June 23. 10 cts.

Electric Cooking and Heating. About 50 cities report incomes from this source. 400 words. Municipal Journal. June 21. 10 cts.

Lighting:

Improvements in the Street-Lighting System of Chicago. Flame arcs to be replaced by mazda C series lamps. 4 ills. 1,200 words. Electrical Review. June 9. 10 cts.

Utilization Factors for Street Lighting Units. Method of calculating flux incident upon street surfaces from the zonal candle powers of the lighting units. By Eugene Peterson. 2 ills. 1,250 words. Electrical World. June 16. 10 cts.

Information Concerning Electric Lighting. Reports from more than 200 cities describing station and street line equipment, current generated or bought, connected load statistics and operating expenses. 13 pages. Municipal Journal. June 21. 10 cts.

Modern Lamps and Industrial Application. The importance of modern lamps in the industrial field. By C. E. Clewell. 12 ills. 2,700 words. Electrical World. June 9. 10 cts.

Progress in the Use of Electricity. Reduction in cost of plant. Nitrogen filled lamps. Power for heating and cooking. From a paper by W. R. Collier. 1,600 words. Municipal Journal. June 21. 10 cts.

Miscellaneous:

Precautions in Fuel Oil Storage. Underground tanks enclosed in concrete are most desirable for storage in small plants. By P. A. Colwell. 2,000 words. Power. June 26. 5 cts.

Electricity in Construction Work. Deals with the characteristics and horsepower requirements of the machines used in outdoor construction work. By H. O. Stewart. 14 ills. 3,000 words. Electrical Review. June 2. 10 cts.

Treatment of Pole Butts. Materials used for prolonging their life. Applying by brush and by open tank process. 2 ills. 1,250 words. Municipal Journal. June 21. 10 cts.

Measurement of Ground Resistance. Data on actual resistance found in over 30 cities. 6,000 words. Electrical Review. June 16. 10 cts.

Transmission-Line Formula. Method of making calculations involved in design of direct current transmission system. By E. M. Richards. 1,500 words. Power. June 12. 5 cts.

Reclamation Pumping a Profitable Power load. By R. M. Boykin. 4 ills. 3,000 words. Electrical Review. June 2. 10 cts.

Street Railway Negative Return System for the Mitigation of Electrolysis. By L. E. Herdt and E. G. Burr. 2,750 words. The Canadian Engineer. June 14. 15 cts.

Oil Engines:

Oil Engines as a Relief Against Coal Prices. Advisability of considering them as a means to reduce standby expenses. Characteristics of various types of internal combustion engines and their different fields of application. By A. A. Potter. 5 ills. 2,000 words. Electrical World. June 9. 10 cts.

Power Plants:

Cooperation Between Central Stations and Private Power Plants. By P. R. Moses and W. F. Schaller. 9 ills. 5,000 words. Power. June 12. 5 cts.

Interconnected Hydroelectric Systems. Washington Power Company operates 4 generating stations. 7 ills. 3,500 words. Electrical Review. June 16. 10 cts.

The Seattle Hydro-Electric Plant. Interesting features of the plant now serving Seattle and details of the new construction work which is to be undertaken. By W. A. Scott. 4 ills. 2,200 words. Electrical Review. June 9. 10 cts.

Canton Substation for Receiving Power from Windsor Plant. A substation with all high tension equipment, a capacity of 50,000 kva., and the largest synchronous condensers ever built. By F. H. Bernhard. 5 ills. 4,000 words. Electrical Review. June 9. 10 cts.

FIRE.

Standard Schedule for Grading Cities and Towns of the United States with Reference to Their Fire Defenses and Physical Conditions. 1,500 words. Fireman's Herald. June 30. 5 cts. 1,500 words. June 2. 5 cts. 1,500 words. June 16. 5 cts. 2,000 words. June 9. 5 cts. 1,200 words. June 23. 5 cts.

Suggested Regulations for Fire Drills. The first of a series of articles dealing with the subjects of fire prevention, fire hazards, fire extinguishment, etc. By E. F. Croker. 1,000 words. Safety Engineering. June. 25 cts.

Proposed Standard Pension Plan of Illinois. 2,500 words. Fireman's Herald. June 23. 5 cts.

Two-Platoon Project at Portland, Ore. 1,200 words. Fire and Water Engineering. May 30. 10 cts.

Motor Apparatus in Fire Departments. 2 pages. Municipal Engineering. June. 25 cts.

STREET CLEANING AND REFUSE DISPOSAL.

Garbage and Refuse:

Refuse Collection and Incinerator Design. Choosing collection equipment and selecting incinerator site. Capacity of plant, details of the building and the chimney, provision for storing refuse and requirements to be embodied in contracts. By C. G. Peterson. 2,200 words. Municipal Journal. June 7. 10 cts.

Saving Expense in Garbage Collection. A study of actual conditions in Billings, Mont. By J. N. Edy, Co. Surveyor. 7 ills. 4,000 words. Municipal Engineering. June. 25 cts.

Specifications for Domestic Garbage Incinerators. By C. C. Myers. 2 ills. 2,500 words. Gas Age. June 15. 15 cts.

Extracting Alcohol from Garbage Would Conserve Vast Quantities of Grain and Potatoes. Experiments at Columbus reduction works promise a profit of $1.34 from alcohol per ton of garbage. Plant to treat 20,000 tons annually can be operated for $29,260. 1 ill. 1,100 words. Engineering News-Record. June 14. 15 cts.

Street Cleaning:

Street Cleaning in New York. Increase and improvement in service and decrease in cost during the past three years. How these were secured. 3,000 words. Municipal Journal. June 7. 10 cts.

Street Cleaning in Philadelphia. Anti-littering campaign reduces amount of cleaning to be done. Cleaning and ash removal done by contract. Hose and machine flushing. Use of motor vehicles. 3 ills. 3,250 words. Municipal Journal. June 14. 10 cts.

Street Cleaning Costs in Philadelphia. 600 words. Municipal Journal. June 28. 10 cts.

Methods and Costs of Street Cleaning and Waste Disposal in Philadelphia. 7 ills. 3,000 words. Good Roads. June 23. 10 cts.

Work of the Philadelphia Bureau of Highways and Street Cleaning in 1916. 5 ills. 3,000 words. Good Roads. June 16. 10 cts.

Motor Vehicles the Key to New York Street Cleaning Problem. Abstracts from annual report of commissioner. 4 ills. 2,200 words. Engineering News-Record. June 7. 15 cts.

MOTOR VEHICLES.

Electric Vehicles for Central Station Service. Advantages of electric trucks for this work. About 1,400 are now used by central stations. Performance, fleet make-up and costs for some of the larger stations. From a paper by Arthur Williams. 8 ills. 4,500 words. Municipal Journal. June 21. 10 cts.

Commonwealth Edison Company to Establish Electric Truck Service. By E. W. Lloyd. 1,000 words. Electrical Review. June 2. 10 cts.

Economies Effected by Electric Refuse Truck. Results in Dover, England. 1 ill. 1,000 words. Electrical Review. June 9. 10 cts.

Electric Vehicles Lower Cost of Coal Delivery. Experience in England. 1 ill. 800 words. Electrical Review. June 2. 10 cts.

New York's Fleet of Municipal Gas-Electrics Saves $71,345 Yearly. Motor vehicles used for all work in model district. Replace 127 horses. 6 ills. 4,000 words. Commercial Vehicle. June 1. 20 cts.

Military Influence on Motor Truck Design. References and completed specifications. By H. D. Church. 30 pages. Journal of the Cleveland Engineering Society. May. 50 cts.

Bids on Army Trucks. Over 100 makes enter proposals. List of complete bids. 2,200 words. Commercial Vehicle. June 15. 20 cts.

Quick Unloading Bodies Save Idle Time. One type dumps 5,000 brick and another discharges at both sides. Stock bodies for adapted Fords. 6 ills. 1,000 words. Commercial Vehicle. June 1. 20 cts.

Labor Economy of Industrial Trucks and Tractors. Data on labor saving and cost of operation. 3 ills. 2,000 words. Electrical World. June 30. 10 cts.

BRIDGES.

Tendencies in Bridge Construction. Increase in loading, simplication of trusses, carbon steel, floors and continuous bridges. 4 ills. 2,500 words. Engineering News-Record. June 14. 15 cts.

Design and Construction Details of a Long Concrete Arch Bridge. Describes the general design and the details of construction of a bridge with eight arches of 52 to 88-foot span. Concrete handled in dump cars and sometimes placed during cold weather. By C. D. Hale. 2 ills. 1,500 words. Cement and Engineering News. June. 10 cts.

Cellular Slab Highway Bridge. New design adopted by the Minnesota highway department. 1 ill. 500 words. Municipal Journal. June 7. 10 cts.

Link Expansion Joints Work on Concrete Viaduct at Denver. 2 ills. 500 words. Engineering News-Record. June 21. 15 cts.

Three-Hinged Arch Highway Bridge Built of Timber. Redwood most economical material at remote site—design favors low cross-bending strength—arches erected by overhead cables. By F. W. Haselwood. 4 ills. 1,800 words. Engineering News-Record. June 21. 15 cts.

Bascule Bridge at Syracuse Typical of New York Canal Crossings. Skew of 23° led to using fixed floor over counterweight pit. Small movable sections along girders provide clearance. By A. G. Hayden. 5 ills. 1,500 words. Engineering News-Record. June 28. 15 cts.

Cost Keeping System for Small Bridge and Culvert Jobs. 4 ills. 1,000 words. Enginering and Contracting. June 27. 10 cts.

Erecting 480-ft. Span of Burlington Bridge. Substructure built with floating plant. Pier cribs set by triangulation. Steel delivered on the ice. 2 ills. 1,000 words. Contracting. June. 20 cts.

A "Freak" Bridge in Wichita, Kansas. A concrete arch. Design selected for permanance and sightliness. By P. L. Brockway. 5 ills. 2,000 words. Concrete. June. 20 cts.

Erecting 775-ft. Spans of the Sciotoville Bridge. Unusual method of erecting the longest simple truss spans in the world. 2 ills. 1,000 words. Contracting. June. 20 cts.

STRUCTURAL MATERIALS.

Utilizing Oversize Material to Increase Output of Small Gravel Plant. 6 ills. 1,500 words. Engineering and Contracting. June 20. 10 cts.

Changes in Sand and Gravel Plant Treble Output. 1 ill. 300 words. Engineering and Contracting. June 20. 10 cts.

7-Day Sand Tests No Criterion for 6-Months' Test. Sand proved unacceptable with different brands of cement in short time tests, but passes tests at end of half year. By L. R. Brown. 1,250 words. Engineering News-Record. June 7. 15 cts.

Steel Column Tests Establish Principles of Strength. Over 200 tests made at Bureau of Standards. Strength found to depend on compressive yield-point of the steel. 5 ills. 4,000 words. Engineering News-Record. June 28. 15 cts.

The Use of Cement in Bulk. 700 words. The Canadian Engineer. June 21. 15 cts.

Gravel Plant Substitutes Electricity for Steam Power. 2 ills. 500 words. Engineering and Contracting. June 20. 10 cts.

Pneumatic Concrete Mixing and Conveying in New York Subways. Improved machines installed for lining tunnels expedite the work by eliminating obstructions and simplifying plant and operation. 5 ills. 1,500 words. Contracting. June. 20 cts.

Effect of Hydrated Lime on Essential Qualities of Concrete. By Norman G Hough. 4,000 words. Journal of Engineers Club of Baltimore. June. 25 cts.

MISCELLANEOUS.

Lake Shore Protection at Chicago Being Built of Concrete. By M. D. Blumberg. 4 ills. 1,750 words. Engineering News-Record. June 14. 15 cts.

Lake Port Improvements Many and Varied. Canvass of work under way. 2,500 words. Engineering News-Record June 14. 15 cts.

River Front Improved Without Cost to Taxpayers. Leasing of filled land at Davenport pays interest on bonds and forms fund for retiring them. 4 ills 1,200 words. Engineering News-Record. June 7. 15 cts.

How to Keep a Construction Camp Clean and Sanitary. Rules adopted for Alaskan railway work have general application on all construction jobs. 1,200 words. Engineering News-Record. June 7. 15 cts.

Accidents on Construction. What they cost and how to prevent them. By J. J. Rosenthal, Safety Engr., Industrial Accident Commission of California. 13 ills. 1,800 words. Enginering News-Record. June 7. 15 cts.

Build Wood Training-Camp City for 5,000 Officers in Three Weeks. All constructed principally by day labor under direction of quartermaster at Ft. Benjamin Harrison, Ind. Motor trucks deliver timber. 3 ills. 1,250 words. Engineering News-Record. June 7. 15 cts.

Attempts to Eliminate Dangerous Railroad Crossings. California Commission makes recommendations to lessen accidents. 700 words. Enginering News-Record. June 28. 15 cts.

(*Continued on page 45.*)

NEWS OF THE SOCIETIES

Calendar of Meetings.

July 10-12.—MUNICIPAL LEAGUE OF INDIANA. Annual convention, Shelbyville, Ind. Secretary, W. S. Jones, City Clerk, Shelbyville.

July 12, 13.—LEAGUE OF MICHIGAN MUNICIPALITIES. Annual convention, Grand Rapids, Mich. Secretary, Charles A. Sink, Ann Arbor, Mich.

July 24-27.—DOMINION ASSOCIATION OF FIRE CHIEFS. Annual convention, Port Arthur and Fort William, Ont. Secretary, James Armstrong, Chief, Fire Department, Kingston, Ont.

July 30-Aug. 3.—SOUTHERN SOCIOLOGICAL CONGRESS. Annual meeting, Blue Ridge, N. C. Secretary, J. E. McCulloch, 508 McLachlen Bldg., Washington, D. C.

Aug. 1-3.—AMERICAN SOCIETY OF SANITARY ENGINEERING. Annual meeting, Grand Rapids, Mich. President, William C. Groeninger, Ohio State Board of Health, Columbus, O.

Aug. 6.—PACIFIC COAST ASSOCIATION OF FIRE CHIEFS. Twenty-fifth convention, Anaconda, Mont. Secretary, ex-Chief H. W. Bringhurst, Seattle, Wash.

Aug. 15-17.—LEAGUE OF WISCONSIN MUNICIPALITIES. Annual convention, Racine, Wis. Secretary, Ford H. MacGregor, Madison, Wis.

Aug. 21-23.—NEW YORK STATE FIREMEN'S CONVENTION, Flushing, N. Y. Secretary, Thos. Honohan, Frankfort, N. Y.

Aug. 22.—UNION OF NEW BRUNSWICK MUNICIPALITIES. Annual convention, St. John, N. B. Secretary, James King Kelley, St. John.

Aug. 27-29.—UNION OF CANADIAN MUNICIPALITIES. Annual convention, London, Ont. Secretary, W. D. Lighthall, K.C., Westmount, Que.

Aug. 29-31.—UNION OF NOVA SCOTIA MUNICIPALITIES. Annual convention, Truro, N. S. Secretary, Arthur Roberts, Bridgewater, N. S.

Aug. 29-31.—ONTARIO MUNICIPAL ASSOCIATION. Annual convention, Toronto, Ont. Secretary, B. H. Spence, 705 Lumsden building, Toronto, Ont.

Sept. 5-8.—LEAGUE OF AMERICAN MUNICIPALITIES. Annual convention, Gary, Ind. Secretary, Robert E. Lee, City Hall, Baltimore, Md.

Sept. 11-13.—AMERICAN ASSOCIATION OF PARK SUPERINTENDENTS. Annual convention, St. Louis, Mo. Secretary, Roland W. Cotterill, 533 City Hall, Seattle, Wash.

Sept. 11-14.—NEW ENGLAND WATERWORKS ASSOCIATION. Annual convention, Hartford, Conn. Secretary, Willard Kent, 715 Tremont Temple, Boston, Mass.

Sept. 18-20.—LEAGUE OF VIRGINIA MUNICIPALITIES. Annual convention, Lynchburg, Va. Secretary, L. C. Brinson, Portsmouth, Va.

Sept. 24-29.—LEAGUE OF CALIFORNIA MUNICIPALITIES. Annual convention, Santa Rosa, Cal. Secretary, Wm. J. Locke, Pacific Building, San Francisco, Cal.

Sept. 25-27.—SMOKE PREVENTION ASSOCIATION. Annual convention, Columbus, O. Secretary, Frank A. Chambers, City Hall, Chicago, Ill.

Sept. 27-29.—AMERICAN AND CANADIAN ENGINEERS AND ARCHITECTS OF NORWEGIAN BIRTH OR DESCENT. Informal congress and re-union, Chicago Norske Klub, Chicago, Ill. Chairman, Committee on Arrangements, Joachim G. Glaver, consulting engineer, Chicago, Ill.

Oct. 15-17.—NATIONAL HOUSING ASSOCIATION. Annual conference, Hotel La Salle, Chicago, Ill. Secretary, Lawrence Veiller, 105 East 22d St., New York City.

Oct. 17-18.—LEAGUE OF MINNESOTA MUNICIPALITIES. Fifth annual convention, St. Cloud, Minn. Secretary-treasurer, Richard R. Price, University of Minnesota, Minneapolis.

Nov. 19-24.—CITY MANAGERS' ASSOCIATION. Annual meeting, Detroit, Mich. Secretary, W. L. Miller, City Manager, St. Augustine, Fla.

Nov. 21-24.—NATIONAL MUNICIPAL LEAGUE. Twenty-third annual meeting, Hotel Statler, Detroit, Mich. Secretary, Clinton Rogers Woodruff, 703 North American Bldg., Philadelphia, Pa.

Nov. 20-23.—PLAYGROUND AND RECREATION ASSOCIATION OF AMERICA. Recreation Congress, Milwaukee, Wis. Secretary, H. S. Braucher, 1 Madison Ave., New York, N. Y.

Connecticut Association of Engineers.

At the convention held at Portland, Me., June 23, officers were elected as follows:

President, W. H. Brown, Meriden; vice-president, A. Anderson, Bridgeport; conductor, James Tobin, Bridgeport; doorkeeper, David Wilcox, Hartford; trustees, Elmer E. Thomas, New Haven, Warren Goodrich of Bridgeport and James McGee of Hartford. Papers on technical subjects were read by B. H. Kearney, C. H. Andrew and C. G. Richardson.

League of Louisiana Municipalities.

Following was the program for the third annual convention of the League of Louisiana Municipalities, which was held in New Iberia June 29-30, as announced by Mayor Elam of Mansfield, who is president of the league:

Friday, June 29.

9:00 a. m.—Address of Welcome—Hon. H. S. Sealy, New Iberia; response, Hon. Alex Grouchy, Jr., Baton Rouge, president.

10:00 a. m.—Reading of minutes, report of treasurer, report of secretary.

11:00 a. m.—"Municipal Ownership a Success"—Hon. W. W. Whittington, Jr., Alexandria.

11:30 a. m.—"Municipalities and Agriculture"—Dr. W. R. Dodson.

12:30 p. m.—Adjourn for lunch.

1:00 p. m.—"How the League's Service May Be Improved"—Hon. Leon I. Kahn, Shreveport.

1:30 p. m.—"Public Schools—Community Builders"—Hon. T. H. Harris, state superintendent public education.

2:30 p. m.—"Municipal Assessments"—Member State Board of Affairs.

3:30 p. m.—"Creating the Community Spirit"—General discussion.

4:30 p. m.—"Administrative Problems"—General discussion.

5:30 p. m.—Meeting of executive committee.

Evening entertainment by city of New Iberia.

Saturday, June 30.

10:00 a. m.—Recommendations of executive committee.

10:30 a. m.—Question box.

11:00 a. m.—"City and Country Interests Identical"—Hon. Martin Behrman, New Orleans.

12:00 m.—"Statewide Co-operation"—Hon. John McW. Ford, Shreveport.

1:00 p. m.—Adjournment for lunch.

2:00 p. m.—Address—Hon. Harry D. Wilson, commissioner of agriculture.

2:30 p. m.—Report of auditing committee, election of officers, selection of city for 1918 convention, unfinished business, adjournment.

Entertainment by city of New Iberia.

Ohio Firemen's Association.

Among the important papers presented at the first annual meeting of the association, held at Springfield, O., June 26-27, were the following:

"Pensions," by Chief T. J. McFarland, Marion; "Standardizing of Hose Couplings," F. M. Griswold, New York; "Automatic Sprinklers As An Aid to Fire Departments," Paul Mason, New York; "Motorized Efficiency," Chief James Fitton, Bellaire; "Spontaneous Combustion," Chief John A. Welsh, Columbus. Other topics of interest will be treated by Captain Sidney Jackson, Dayton; T. Alfred Fleming, state fire marshal and Captain J. J. Conway, of Cincinnati.

North Carolina Good Roads Association.

Because of the fact that a number of the members of the North Carolina Good Roads association are members of the State Press association, which was to meet at Wrightsville Beach, near Wilmington, on June 27, 28 and 29, it was decided to change the dates of the meeting of the road convention here to Monday, Tuesday and Wednesday, July 9, 10 and 11.

The three principal topics for discussion at the convention this year were:

1. Operation of the laws passed by the legislature of 1917 relating to road building.

2. Road maintenance, with special reference to the use of the automobile tax in maintenance of the state highways.

3. The building of roads of military value.

A significant feature of the convention was the fact that much of the discussion concerned itself, directly or indirectly with questions relating to road building in war time.

Kansas King of Trails Association.

During the last two years this Kansas organization has conducted a campaign for an international highway from Winnipeg, Canada, to the Gulf of Mexico, with an anticipated terminus at the City of Mexico.

Officers of this Kansas association have logged and charted the entire length of a tentative location from Winnipeg to Galveston and San Antonio. The total mileage is approximately 2,100 miles, of which more than 1,000 miles has been marked according to a recognized standard. The utmost care has been exercised to locate this highway along natural lines of travel, with the sole purpose of linking together centers of population along the shortest and best routes, and not one mile has been located in con-

sideration of any payment of money by any community or persons.

Deeming that this work has reached a stage where it ought to be encouraged and promoted by a great international organization, there was issued a call for delegates to assemble in Kansas City, Kan., July 11 and 12, 1917, for the purpose of perfecting a permanent organization to promote the hardsurfacing of this road, by adopting a constitution, adopting a definite route, electing officers and taking care of such other business as may be rightly come before such a body. The call said:

"Everybody interested in the promotion of good roads will be welcome at this convention; but the control of the preliminary organization will be vested in delegates from counties along the line of the tentative location of the road in proportion to road mileage.

Each county shall be entitled to one vote for each mile of road in the county. Proxies will be permitted, but no person will be permitted to vote more than five votes nor hold proxies for any county outside the one in which he lives.

The president and secretary of the organization issuing this call shall have authority to seat delegates from contested routes on the same basis of representation as above.

Credentials must be signed by the vice president of the King of Trails county organization, or in counties having no King of Trails organization by the chairman of the board of county commissioners or the county clerk."

W. W. Brown is president and Dr J. C. Cornell is secretary of the organization.

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

SEWERS to be constructed by Union City, Pa., were planned by Phillips & Miller, Meadville, Pa.

Geraldine, Mont., is to make STREET IMPROVEMENTS. The engineers are Gerharz-Jaqueth, 514 First National Bank Building, Great Falls, Mont.

Commerce, Okla., is to improve its SEWER SYSTEM. The engineers for the work are the Benham Engineering Company, Oklahoma City, Okla.

The village of Keewatin, Minn., is to construct a CENTRAL HEATING PLANT. The engineer for the project is L. A. Lawson, 2118 Hendon avenue, St. Paul, Minn.

STREET IMPROVEMENTS are to be made by Fullerton, Neb. Plans and specifications were prepared by Bruce & Standeven, 430 Bee Building, Omaha, Neb.

SEWERAGE IMPROVEMENTS are to be made by Marshall, Minn. The consulting engineer for the work is J. H. A. Brahtz, 312 Commercial Building, St. Paul, Minn.

Grenola, Kan., is to improve its ELECTRIC LIGHT PLANT, following the completion of plans by W. B. Rollins & Co., 209 Railway Exchange Building, Kansas City, Mo.

A reinforced CONCRETE BRIDGE is to be built by the city of Fairmont, W. Va. Plans and specifications for the structure were prepared by the Concrete-Steel Engineering Co., designing engineers, Park Row Building, New York, N. Y.

Duquesne, Ia., is considering the improvement of its WATER SUPPLY SYSTEM. At the request of the board of water works trustees, dean A. Marston, of the engineering school at the state university, Ames, Ia., and C. S Nicholson, have been investigating and will make a report and recommendations.

Sanitary SEWERS being constructed by West Frankfort, Ill., were planned by P. B. Wilson, Marion, Ill.

Dodge Center, Minn., is to construct a SEWERAGE SYSTEM, plans being in preparation by J. F. Druar, 312 Commercial Building, St. Paul, Minn.

STREET IMPROVEMENTS are to be made by Ceredo, W. Va. The engineer for the work is F. W. Gesling, Ashland, Ky.

WATER SUPPLY improvements are to be made by Denmark, Wis., according to plans and specifications by W. G. Kirchoffer, 33 Vroman Building, Madison, Wis.

Christopher, Ill., is considering extensive STREET IMPROVEMENTS. The engineer retained on the project is Lee Harper, 14 State street, East St. Louis, Ill.

Nanticoke, Pa., is to build a SEWAGE DISPOSAL PLANT. The consulting engineer for the work is Oliver F. Starr, of the Green-Starr Engineering Co., 1530 Chestnut street, Philadelphia, Pa.

Oswego, N. Y., is fighting a taxpayers' action seeking to restrain it from issuing bonds for POWER DEVELOPMENT. The city's expert witness in the case is John A. Bensel, Albany, N. Y.

Pittsburgh, Pa., is confronted by a number of important PUBLIC UTILITY problems and has decided to retain a number of experts to be paid out of a $75,000 budget appropriated for the purpose. Bion J. Arnold, of the Arnold Company, 105 South La Salle street, Chicago, Ill., is to investigate the STREET RAILWAY situation. Frederick W. Ballard & Co., Cleveland, O., C. W. Pike, Philadelphia, Pa., Edward W. Bemis, Chicago, Ill., and W. E. Reed, Pittsburgh, Pa., are to investigate the ELECTRIC LIGHT RATES. Edward W. Bemis is also to report on the GAS RATES.

Ohio Police Chief's Association.

Chief Hardenstern, of Youngstown, Chief Weingates of Sandusky; Chief Stamberger, of East Cleveland; Chief Stankard, of Elyria, and Chief A. A. King, of Lorain, comprising a board of governors of the Ohio Police Chief association decided at the meeting held at Lorain June 26 not hold the annual convention this year. The meeting was called for the purpose of determining the dates of the convention scheduled to be held in Columbus.

The police chiefs concurred that it would be unwise to hold the annual convention this year under the existing conditions. It was thought that their services were required constantly at home. Assurance was given that the attendance would be small, if the convention was held as planned.

Pennsylvania Chiefs of Police.

J. H. Tillard, chief of police of Altoona, was elected president of the Pennsylvania State Chiefs of Police Association at its annual convention in Philadelphia June 21. Altoona was selected as next year's convention city after a spirited vote. Other officers chosen include: Vice-president, Lona B. Day, superintendent of police, Scranton; secretary and treasurer, Wm. B. Thomas, chief of police, Jenkintown; executive committee, James Robinson, superintendent of police, Philadelphia, chairman; Edward T. Hallissey, chief of police, Haverford Township; Manfred Naar, chief of police, Philadelphia and Reading Railway; Garrett Roach, chief of police, Bethlehem Steel Company, South Bethlehem; J. Edward Wetzel, chief of police, Harrisburg, and M. G. Turney, inspector of police, Pennsylvania Railroad. Altoona. A resolution was adopted thanking Governor Brumbaugh for signing the civil service bill for policemen in third class cities, which was advocated by the association.

PERSONALS

A number of the larger counties of Kansas have sent to the state highway commission their nominations for county engineers, six of which have been confirmed by the commission. The new engineers added to the list already confirmed and the counties in which they will work are: John E. Williams, of Topeka, Shawnee county; J. M. Bradley, of Winfield, Cowley county; A. J. Francis, Jr., of Russell county; Aubert J. Mowry, of Lucerne, Sheridan county, and P. W. Wright, of Holton, Jackson county.

Broderick, James C., chief of the Detroit, Mich., fire department for more

(*Continued on page 45.*)

BOOK REVIEWS

STATE SANITATION: by George Chandler Whipple. Volume I, 377 pages, illustrated. Harvard University Press, Cambridge, Mass. Price, $2.50.

Professor Whipple, who is also a member of the Public Health Council of the Massachusetts State Department of Health, in this volume begins a complete review of the work of the state board since its establishment in 1869. It is more than a dry record of research significance—it is the story of public health conservation in this country, of the evolution of modern theories and modern methods of health control from the early passive superstitions. It is because the Massachusetts board has been always at the frontier from the very beginning, because the physicians, engineers, chemists and biologists have been leaders in their professions that almost the whole history of preventive medicine and sanitation in this country is reflected in this story. Three objects are given for the book—to record the past work of the board, to revive some of the older writings which would otherwise be lost and to show how the work of the board has fulfilled the ideals set forth in that truly epoch-making document, the "Report of the Massachusetts Sanitary Commission of 1850."

There is more than anecdotal interest in reading of the days in Massachusetts when an epidemic swept the cities almost every year. In 1678, there was a smallpox epidemic in Boston and "sickness and bad seasons were attributed by our pious ancestors to the irreligion of the times, and to their disuse of fasting, and a meeting was held to investigate the causes of God's judgments, and to propose a plan of reformation." In 1721 Dr. Zabdiel Boylston tried to introduce vaccination and "many persons were struck with horror; some thought it was sinning against God, thus to interfere with the disease; and others that, if any patients died, Dr. Boylston ought to be treated as a murderer." Throughout the story we see the growth of scientific knowledge, beneficial legislation and popular education—we can watch the development of that true statesmanship which is concerned with the welfare of the people and of that true enlightenment which encourages that statesmanship and seeks to follow its guidance.

There are three volumes in this work. The first, which is under consideration here, has two parts: The history of the board and the "Report of the Massachusetts Sanitary Commission." The two parts of the second volume contain thirty-four articles selected from the annual reports and monthly bulletins of the board and short abstracts of nearly all of the scientific articles and reports published between 1870 and 1914. Parts V and VI, in the third volume, include a guide to the forty-six annual reports, properly indexed, and a series of biographical sketches of the engineers, chemists and biologists of the board. In the present volume the history is divided into five periods: 1630-1869; 1869-1879; 1879-1886; 1886-1914; 1914-1916. Other chapters are entitled: "Health of the People," "The Anti-Toxin and Vaccine Laboratory," "Protection of the Food Supply," "Protection of the Purity of Inland Waters," "The Lawrence Experiment Station and the State House Water and Sewage Laboratories," "Later Engineering Work," "Cost and Achievements of the State Board of Health," "Personalia" and "State Sanitation." The report of the sanitary commission, 1850, with its plan of the proposed sanitary survey is worthy of earnest study and will bear comparison with the constructive work of the present. Illustrations of men and of engineering work and of comprehensive charts add to the interest of the volume.

We have long needed just such a work as this of Professor Whipple to give perspective of the development of public health thought, to discover the origins of our current theory and practice and to give the feeling of continuity in the progress of the field which everyday work tends to deaden. Professor Whipple's volume should become a standard part of all public health courses in universities and should be on the shelf of every city and state official, sanitarian and sanitary engineer who has more than an official interest in the problems of public health conservation.

PERSONALS

(Continued from page 44.)

than 20 years, and a member of the department for fifty years, has resigned. Assistant chief McGraw will become acting chief.

Brooks, J. P., has been elected chief of the Danville, Va., fire department.

Carter, R. O., has been re-appointed chief of the fire department of Bluefield, W. Va. N. D. Dillow is the new chief of police.

Dudley, Warren Preston, secretary of the Massachusetts Board of Civil Service Commissioners since its incorporation in 1884, died June 27 at his home, 14 Oak street, Belmont, Boston, after a long illness.

Hazlehurst, James N., consulting municipal engineer, has lately received a commission as major, Engineer Corps, U. S. Army Reserve, and is now on active duty at Atlanta, Ga., cooperating with the constructing quartermaster on cantonment construction near Atlanta.

Kinney, William M., has just been elected to the executive committee of

(Continued on page 48.)

MUNICIPAL INDEX

(Continued from page 805.)

Canadian Cantonments All Built by One Contractor. 5 ills. 800 words. Engineering News-Record. June 28. 15 cts.

Drag Line Eliminates Haulage Equipment on Railroad Work. By W. A. Pillans. 2 ills. 1,000 words. Engineering News-Record. June 28. 15 cts.

Labor Conditions and How Contractors See Them. Shortage of supply and shifting of men from place to place constitute difficult problem and chief cause of decreasing efficiency. 2,000 words. Engineering News-Record. June 28. 15 cts.

Convert Team Outfit Into Tractor-Trailer Equipment Where Horses Are Scarce. By L. R. Barnes. 1 ill. 600 words. Engineering News-Record. June 21. 15 cts.

Baltimore's Purchasing System. 500 words. Municipal Journal. June 7. 10 cts.

How High Are Prices? Editorial discussion. 1,000 words. Municipal Journal. June 7. 10 cts.

System in a City Engineer's Office. A simple office record and field system From a paper by Manly Osgood. 3,000 words. Municipal Engineering. June. 25 cts.

Hauling Gravel by Team and Tractor and Comparative Costs. From a paper by O. L. Kipp. 1 ill. 1,000 words. Municipal Engineering. June. 25 cts.

Japanese Masonry Work. By J. L. Harrison. 6 ills. 1,250 words. Engineering and Contracting. May 23. 10 cts.

Size of Mixer and Size of Job on Which Mixer Should be Used. 300 words. Enginering and Contracting. May 23. 10 cts.

Reducing Labor Cost of Masonry. Handling bricks, cement and mortar by automatic carriers. 2 ills. 800 words. Contracting. June. 20 cts.

Some General Principles of Physical Valuation. Abstract of report to the Royal Commission. By Geo. F. Swain. 1,500 words. The Canadian Engineer. June 7. 15 cts.

Methods and Costs of Constructing Cofferdams at St. Marys Falls Canal. 9 ills. 5,000 words. Engineering and Contracting. June 20. 15 cts.

Distribution of Pressure in Earth Due to Concentrated External Load. Results of a series of experiments. Apparatus and method of conducting tests. 8 ills. 2,000 words. Engineering and Contracting. May 23. 10 cts.

Electric Ditching Machine on Railway Construction. 3 ills. 1,100 words. Engineering and Contracting. June 20. 10 cts.

The Kansas City Park System and Its Effect on the City Plan. From a paper by Geo. Kessler. 3 ills. 3,500 words. Good Roads. June 2. 10 cts.

The Engineer in Politics. From a paper by R. G. Dieck. 3,000 words. Engineering and Contracting. June 20. 10 cts.

Government Cantonments and Outline of Form of Contract for Their Construction. 1,200 words. Engineering and Contracting. June 27. 10 cts.

Graphical Determination of the Moment of Inertia of Complex Beam Sections. By W. S. Wolfe. 17 ills. 2,200 words. Engineering and Contracting. June 27. 10 cts.

Scheduling Progress of a Big Construction Job. Method used by the Aberthaw Construction Co., of Boston. 2 ills. 1,500 words. Engineering and Contracting. June 27. 10 cts.

Distribution of Pressures Through Earth Fills. Tests made at U. S. Office of Public Roads. 4 ills. 1,500 words. Engineering and Contracting. June 27. 15 cts.

Electric Shovels. Brings out such characteristics as have a marked bearing on the selection of the type of motor to accomplish the desired result. By H. W. Rogers. 8 ills. 2,350 words. General Electric Review. June. 20 cts.

Organization and Duty of Engineer Troops. By Capt. F. B. Downing. 3,500 words. Journal of the Boston Society of Civil Engineers. June. 50 cts.

New York State and Her Barge Canal. By L. H. Hart. 13 ills. 18 pages. Journal of the Cleveland Engineering Society. May. 50 cts.

Electric Arc Welding. By H. L. Unland. 16 ills. 3,500 words. General Electric Review. June. 20 cts.

Municipal Accounting. The fourth of a series of articles. By E. T. Sampson. 2,200 words. Canadian Municipal Journal. June. 15 cts.

NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

RECORDING-DEMAND WATTHOUR METER.

Type RA Westinghouse Device for Permanent Record.

The demand system of metering is becoming general in central station power contracts. With large power requirements, it is common to fix the rate for the service by the time and duration of occurrence of the maximum demand as well as by the amount of this demand. To determine this, a reliable demand meter giving a permanent graphic record is required.

The type RA recording-demand watthour meter, in one unit, measures both the kilowatt-hours consumed and the integrated demand. It indicates on a four-counter dial the total kilowatthours consumed and records in a permanent form the integrated demand over successive predetermined time intervals. It is installed as an ordinary watthour meter and requires no additional apparatus or wiring. The measuring and recording elements are mechanically inter-connected; there are no electrical contacts to become inoperative. The recording element is controlled by an exceptionally high-grade clock having features that make not only for clock accuracy, but for reliability of continuous operation. The measuring element is the standard Westinghouse type OA watthour meter with special gear train.

The type RA recording-demand watthour meter consists of a watthour meter with the usual four-counter register and, in addition, the mechanism for obtaining a graphic record of the demand. The time interval of the meter and the advance of the record paper are controlled by a high-grade hand-wound clock.

Under load, the gear train of the watthour meter advances the counters in the regular manner. At the same time the gear train causes the ink-carrying pen to advance across the record paper in proportion to the energy registered. At the end of a predetermined time interval a stud on the reset wheel releases the pen gear from mesh with the gear train and a balancing weight returns the pen to zero, where it is again meshed with the gear train to repeat its advance during the next time interval. Meters are made for 15, 30 and 60 minute intervals; a meter made for one interval can readily be changed to operate at one of the other intervals.

Irrespective of the time interval of the meter, an operating spring, controlled by the clock, causes the paper to advance one-sixteenth inch every 15 minutes. Thus, if the meter is arranged to have 15-minute intervals, the paper advances just before the pen is reset, so that the pen makes a distinct and readily observed record of the maximum pen travel, showing both the amount of integrated demand, and, by the time calibration printed on the record paper, the time of its occurrence. If the meter is arranged to have 30-minute intervals, the paper therefore advances one 15-minute space between periods, causing an offset mark on the chart at the middle of the 30-minute interval. This offset mark enables the reading of the integrated demand at 15-minute intervals, as well as at 30-minute. Similarly, if the reset wheel is set for 60-minute intervals, three offset marks indicate the 15-minute demands between each regular one-hour demand.

The entire meter is mounted on a cast iron base. The cover is of pressed zinc with dead black finish, and is fitted with a dust-proof gasket. The glass windows over the dial and chart are well sealed. The electrical measuring element consists of the standard Westinghouse type OA watthour meter on its own supporting casting, but without cover. Therefore, the element can be removed from the case as a unit without changing the calibration.

The paper driving mechanism is a metal drum with pins that engage in perforations in the record paper, driven through gearing by the operating spring. The paper, which is furnished in 18-foot rolls (thirty-six days supply), is held on a spindle, and is wound off this on to a drum by the driving mechanism.

The accompanying illustrations show the meter, the mechanism and the record for fifteen and thirty-minute intervals.

The type RA recording-demand watthour meter is made by the Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa.

EMERGENCY FIRE TRUCK.

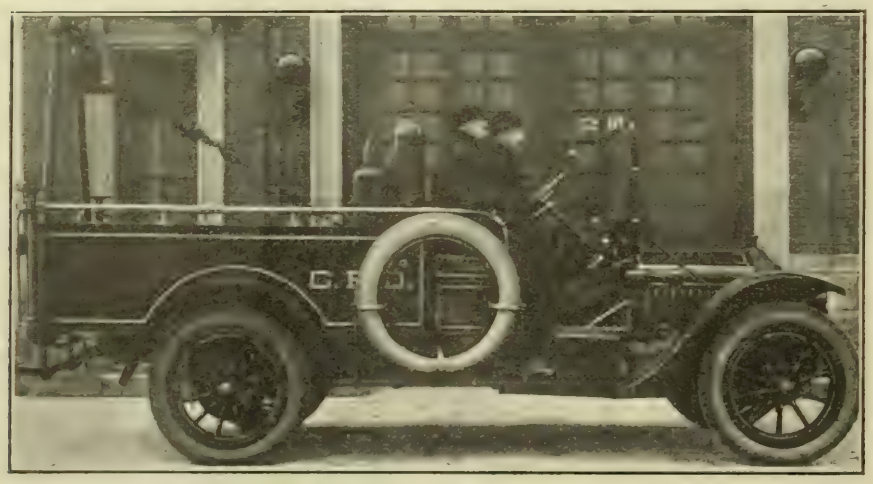
For Repair Work at Fires.

The Chicago fire department is using a new type of emergency truck equipped for the specialized work of repairs to apparatus actually in service at fires. Since its installation six months ago the truck has been on duty twenty-four hours a day and three crews of men have been employed to run it.

Pieces of fire apparatus which break down or become damaged in responding to alarms are quickly repaired or towed to the shops. Wreckage and obstructions of all kinds are cleared up.

Attached to the rear frame is a chain hoist. In the body of the truck is a jack capable of raising twenty tons. A special towing attachment having a coil spring draw-bar makes it easy for this comparatively small truck to pull heavy pumping engines, hook and ladder trucks and other heavy apparatus. Compartments along the sides carry tools of every description, including a strong vice. Two steel tanks are provided for oxy-acetylene welding of parts, the cutting of steel bars, plates and other metal. This work is done by an attendant who is an experienced mechanic and an expert welder.

The truck, which is shown in the accompanying illustration, is made by the White Company, Cleveland, O.



CHICAGO'S WHITE TRUCK FOR FIRE-APPARATUS REPAIRS.

INDUSTRIAL NEWS

Cast Iron Pipe.—Prices continue at the record high levels of last week. While private buying continues to a slight extent, municipal calls have practically stopped. Quotations: Chicago—4-inch, class B and heavier $68.50; 6-inch, $65.50. New York—4-inch, class B and heavier, $68.50; 6-inch, $65.50. Birmingham—4-inch, class B

and heavier, $63; 6 inch, $60; class A, $1 extra.

The General Filtration Company, Cutler Building, Rochester, N. Y., has just published a new booklet on "Filtros," the porous mineral medium used in waterworks and in the activated sludge process of sewage disposal. The new catalogue contains considerable detailed information on the manufacture, composition, shapes, grades, uses and applications of Filtros. Those superintendents and engineers who have not yet used Filtros will find the new catalogue a good introduction to its properties and possibilities, while those who have already tested it will receive useful information from it regarding particular grades for definite types of service and methods of installation and maintenance. The book is excellently gotten up and well illustrated to cover all points regarding the material.

The Power-Transmission Safety Code presented to the joint meeting of the American Society of Mechanical Engineers and the National Machine Tool Builders' Association in Cincinnati has also been recognized by the National Association of Manufacturers. Copies may be obtained by applying to the American Society of Mechanical Engineers, 29 West 39th street, New York, or the National Association of Manufacturers, 30 Church street, New York.

Summer Course in Concrete Work.—Concrete, as a representative industrial activity, has been one of the recent additions to vocational and industrial arts courses in many schools. As a result of the unusual interest which this work has created, the Portland Cement Association has been deluged during the past year with requests for information about school work in concrete, and a number of teachers expressed a desire to spend time during the summer at some teachers' training school where they would have the opportunity to learn more concerning this new phase of industrial arts work. Several hundred interested industrial arts teachers representing every state in the Union gathered at Lewis Institute, Chicago, for one week of concrete work last summer. This short time spent together proved very profitable to every one, and the meeting was a great clearing house for ideas, suggestions, and data on industrial arts work. The course was practical and at the same time full of information for those who wished to learn the theory and fundamentals of concreting. Mixing and placing concrete, form construction, and the casting and curing of the products were carried out in connection with the various types of concrete work. The breadth of application of industrial fields, coupled with the possibility of unusual interest on the part of the pupil in exercising his originality and ingenuity, has resulted in the establishment of many courses in concrete. The University of Chicago Summer School offers for this year a series of lectures by engineers and teachers thoroughly familiar with the cement industry and the subject of concrete as taught in manual training and vocational courses. These lectures are open, without charge, to every one interested in the subject. They are being given in Belfield Hall, Room 159, the course ending July 23.

According to a statement by P. J. Lyons, president of the **Bull Tractor Company,** together with this concern and the **Toro Motor Company,** of Minneapolis, will be merged with the **Whitman Agricultural Company,** of St. Louis. The new firm, which will be known as the **Whitman Bull Tractor Company** will have a capitalization of $1,250,000 of 8 per cent accumulated preferred stock and 12,000 shares of common stock. The Minneapolis plant will be moved to St. Louis.

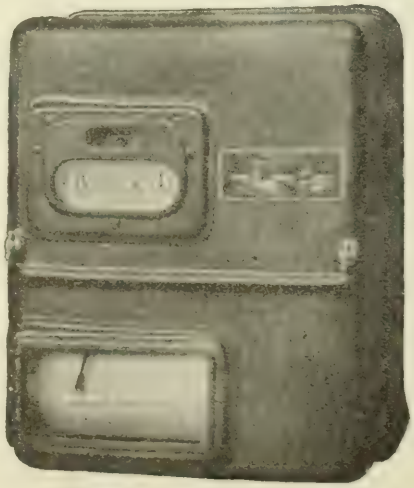
Equipment for Waterworks in India.—A large proportion of the supplies for waterworks and drainage schemes is obtained from the purchasing agent of the Indian Government in London, the director general of stores, India office. The indents are drawn up and forwarded from the government engineers at Madras, and these indents specify the types of articles wanted and the quantities, but local firms which have been approved by the government and which have articles in stock of the desired standard are in a position to compete for the contracts. Firms on the approved list are those which have complied with the government's requirements as to possessing workshops and appliances capable of turning out satisfactory work. These firms, by being familiar with local conditions and knowing what construction work is in progress or projected, and also the types of equipment most likely to be demanded, are often able to obtain contracts. While it is desirable therefore that American manufacturers desiring to offer goods for these contracts should keep in touch with the store department, India office, London, they should also be directly represented in India by an agent, either through one of the local English firms or by an American representative sent out especially for that purpose.

The method of purchasing government stores in India is described on pages 147-151 and 205-214 of "British India, with notes on Ceylon, Afghanistan, and Tibet," Special Consular Series No. 72, obtainable at $1 per copy from the district offices of the Bureau of Foreign and Domestic Commerce, or from the Superintendent of Documents, Washington, D. C.

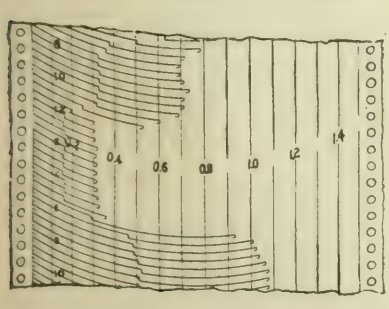
American firms desiring full particulars as to the water supply and drainage works in progress or projected in the Madras Presidency may obtain them by consulting a copy of Part 1 of the Administration Report of the Department of Public Works for 1915-16 (with a detailed review of civil works and railways), which is obtainable from publishing houses in England. The cost of the publication is $0.28, to which postage should be added.

Import Duties on Motor Vehicles and Accessories.—The numerous changes that have been made in the rates of import duty on motor vehicles during the last three years and the restrictions which have been placed upon their importation in certain foreign countries have made it desirable that the information contained in "Tariff Series No. 30, Foreign Import Duties on

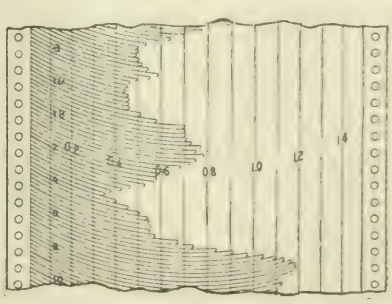
MECHANISM.



WESTINGHOUSE RECORDING-DEMAND WATT-HOUR METER.



30-Minute Chart.



15-Minute Chart.

Motor Vehicles and Accessories," published by the Bureau of Foreign and Domestic Commerce, should be supplemented and brought down to date. With object of making the latest information on the subject readily available to manufacturers and exporters of motor vehicles, including motorcycles and motor trucks and their accessories, there has been prepared a supplement entitled Tariff Series No. 30A, Supplement to Foreign Import Duties on Motor Vehicles and Accessories, correcting the original editon to June, 1917. In general, the supplement reproduces only such tariff items as have been changed, and it should therefore be used in connection with Tariff Series No. 30. Copies of this supplement can now be purchased at 5 cents each from the Superintendent of Documents, Washington, or at the District Offices of the Bureau of Foreign and Domestic Commerce, or the original edition together with the supplement may be secured at 10 cents from the same offices.

Road Building Tractors in Japan.—The Department of Internal Affairs, after an investigation, has decided to improve the roads in this country. Tractors will probably be used. A list of importers of machinery in Kobe and Osaka who might be interested in receiving literature about tractors may be obtained from the Bureau of Foreign and Domestic Commerce, Washington, D. C., by referring to File No. 89249.

Lead Production in 1916.—The output of primary refined lead in the United States in 1916, according to a report by C. E. Siebenthal of the U. S. Geological Survey, was 571,134 net tons, against 550,055 tons in 1915, an increase of 3.8 per cent. This is a record. The primary lead available for consumption is given as 477,384 tons for 1916, an increase of 12 per cent over that for 1915, which was 426,364 tons. This is also a record. The exports of domestic lead in 1916 were very large, 100,565 tons, against 87,306 tons in 1915 and 58,722 tons in 1916.

PERSONALS

(Continued from page 45.)

the American Society for Testing Materials.

Lehrbach, Henry G., C. E., has been appointed and confirmed assistant civil engineer in the navy. Mr. Lehrbach was appointed from civil life, one of twenty-five such appointments made by the President on June 21. He is a graduate of the school of engineering of Cornell University and for a time was connected with state highway work in New York, resigning in 1915 to join the engineering staff of The Dunn Wire-Cut Lug Brick Company, of Conneaut, Ohio. He was division engineer of the Atlanta, Ga., division for a time, but later was transferred to the district having headquarters at Columbus, O., a position he was filling when he received his appointment.

State of New York—The Civil Service Commission.

JULY 28, 1917.

1. Open competitive examinations will be held throughout the state on the date mentioned above, for the positions mentioned below. Candidates must execute an application form and file it in the office of the Commission, as above indicated. Accepted candidates will be notified about a week prior to the date set, when and where to appear for examination. No one will be admitted to the examination without the official notice. If an application should be rejected, due notice will be sent. The Commission does not send formal acknowledgment of receipt of application. Candidates in all examinations, unless otherwise specified, must be full United States citizens, by birth or naturalization and in the latter case naturalization papers must be submitted in proof of claim. Unless otherwise specified below, examinations are open to men and women at least twenty-one years of age on the date of the examination. Three months' residence in New York State is usually required. The Commission may, however, suspend the requirements as to residence and citizenship where such requirements are disadvantageous to the public interests. In writing for application form or information, candidates should specify particularly the position as given below, for which they desire to be examined. Send application, properly filled out, sworn to, and with the certificates signed to the "State Civil Service Commission, Albany, N. Y.," as soon as possible after the announcement of the examination.

Application forms will not be sent out by mail after July 16; if they are received at the office of the Commission after July 18 they will not be accepted.

210. Assistant Chemist, Public Service Commission, First District. $1,201 to $1,500. Men only. Candidates must be graduate chemists with at least two years' practical experience. The examination will presuppose a familiarity with analyses of steel and cast iron, cement, asphalt, coal tar pitches, mixed paints, dry pigments, etc., water analysis, gas-testing methods, use of the microscope and general chemistry. Subjects of examination and relative weights: Written examination, 6; education and experience, 4. Open to non-residents.

211. Junior Assistant, Grade 6, Engineering Departments. $901 to $1,200. Men only. Minimum age, 20 years. Subjects of examination and relative weights: Problems in applied mechanics and mathematics, including surveying, elementary structures and hydraulics; questions on surveying and construction practice, and on materials of construction, 3; experience, education and personal qualifications, 2. Open to non-residents. Original appointments are usually made at the minimum salary with opportunity for subsequent increase.

212. Junior Electrical Engineer, Public Service Commission, First District. Salary $901 to $1,200 a year. The duties are to inspect the power houses and equipment of subway, elevated and street railways, lighting and power companies in New York City. Candidates must have had at least three years' training at a technical school of recognized standing and not less than one year's experience in electric railroad or electric lighting work or in the manufacturing or installation of electrical or mechanical apparatus. Subjects of examination and relative weights: Theoretical and practical questions relating to the construction and operation of power house and railway equipment, electric distribution, measurements, standards, and other pertinent subjects, 5; exnerience and personal qualifications, 3; education, 2. Open to non-residents.

214. Electric Inspector, Public Service Commission, Second District. Salary, $1,200. The duties are to inspect the property, and especially the overhead lines, of electric corporations in New York State outside of New York City, and to compile comprehensive and intelligible reports. Candidates should have a general elementary knowledge of the theory of electricity, generation, transmission, etc., and must have had a high school training or its equivalent, and not less than two years' practical experience of a character such as to give familiarity with the operation of generating stations and with the construction and maintenance of underground and overhead electric lines. Technical education will receive credit as equivalent to experience, graduation from a school of the highest standing being counted as one year's experience. Subjects of examination and relative weights: Written examination, pertaining to the duties of the position, 1; experience and training, 1.

215. Engineering Inspector. State Architect's Office. $1,800 to $2,500 and necessary traveling expenses. The position requires technical knowledge of the following: High and low pressure steam, and hot water heating systems; plumbing, electric wiring and switch board work; house sewage disposal; refrigerator, laundry, and electrical and steam power equipment; materials of construction; testing and testing instruments; machinery foundations; architectural plans and specifications; also practical experience in supervising the installation of machinery, etc., familiarity with the various makes of machinery and apparatus used for the foregoing purposes, and general knowledge of the Underwriters' rules. Graduation or partial course in mechanical or electrical engineering is desirable. Subjects of examination and relative weights: Practical questions, 5; experience and education, 5.

216. Sanitary Engineer., State Architect's Office. $1,800 to $2,500. Applicants must have had at least four years' satisfactory experience in sanitary engineering. Credit will be given for technical education not exceeding one year's practice. The duties of the position will include the design and supervision of the construction of sewage disposal, water supply including filtration, house drainage systems, plumbing fixtures, preparation of specifications. Subjects of examination and relative weights: Written examination, 3; experience, education, etc., 2.

219. Physiological Chemist, State Department of Health. Salary $1,500. Applicants should have a thorough knowledge of the principles of physical, organic and physiological chemistry, and they should have had at least three years' practical experience in physiological or biological chemistry. Candidates will be rated on a written examination relating to the duties of the position, weight, 1; and on their general and special training and particularly their practical experience and personal qualifications as shown by their sworn statements and by answers to such inquiries as the Commission may make of their former employers and others acquainted with their qualifications and experience, weight, 1. Open to non-residents and to citizens of other countries, except those at war with the United States.

222. Examiner, State Department. $1,500 to $1,600. The duties of this position will require men of good judgment who are accurate with figures and have sufficient knowledge of the tax law to enable them to determine and classify the several classes of corporations, to examine and analyze accounts and render conclusive reports thereon. They must also have a definite knowledge as to how to segregate such accounts as legally belong to the credit of this state in an apportionment. Subjects of examination and relative weights: Arithmetical computations including proportion and percentage, 1; questions on the application of those parts of the tax law which relate to the definitions for classification, 1; education, experience and personal qualification, 3.

223. Assessing Clerk, State Tax Department. $1,800 to $2,400. These positions will require ability to analyze and adjust the relations existing between the various elements in reports to the department, particularly as regards tangible personal property and services rendered; to allocate properly such elements as regards the apportionment of net income; to determine the amount to be retained by the state and the portion to be returned to the several counties, cities and towns of the state. This will include a knowledge of Article IX and IX-a of the tax law and a working knowledge of such decisions as are necessary to do such work. Subjects of examination and relative weights: Arithmetical computations including proportion and percentage, 1; questions on the application of those parts of the tax law which relate to the definitions for classification, the allocation of property in and out of the State, and of net income and the redistribution of taxes, 1; education, experience and personal qualifications, 3.

Municipal Journal

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SAVING COAL IN THE WATERWORKS PUMPING STATION

Losses in the Boiler Plant and How to Prevent Them—Firing—Air Leaks—Clean Tubes—High Pressure—Engine Performance—Slippage—Utilizing Heat in Exhaust Steam.

By MILTON F. STEIN.*

The average small waterworks pumping station is perhaps better maintained and operated than other power plants of the same size. Yet many conceal gross inefficiency behind bright paint and brass, and, in many more, even this veneer of self-respect is lacking. In the past, suggestions in behalf of more efficient operation have not always received serious attention, as the price of fuel was low, and its effect upon the total cost of furnishing water was more or less obscured by labor, material, maintenance and other charges. But within the last year the price of fuel has risen enormously, and the demand has greatly exceeded the supply; and more recently our entrance into the war has made it a patriotic duty to conserve the available supply to the end that it may meet, as far as possible, the many demands that will be made upon it.

BOILER PLANT SOURCE OF LARGEST FUEL LOSSES.

The largest source of fuel losses is the boiler plant, perhaps because these losses are intangible to our senses and the operations of boiler-tending seem so simple. Hence we turn over the coal pile to the fireman with instructions to keep the steam up, and consider the matter settled. Yet, if we wish to improve or maintain plant economy, it is of primary importance to keep tab on boiler performance. This is not difficult. It involves merely weighing the coal and measuring the water fed into the boiler and there evaporated. For greater accuracy the steam pressure and feed-water temperature should be recorded also. The only special equipment needed is a platform scale for weighing the coal (capacity, 500 to 1,000 pounds), a small car for carrying the coal from the storage pile to the scale and thence to the firing floor, and a meter in the feed-water line. Lacking a feed-water meter, the boiler feed pump can be furnished with new, tight valves and repacked, and the pumpage computed with fair accuracy from its stroke counter, but this method is not recommended. From these data the evaporation per pound of coal can readily be figured. The following table gives the evaporation, from feed water at 60° F. to steam at 100 pounds gage, per pound of coal, which may be expected under good conditions:

Kind of Coal.	Evaporation (From 60°F. to steam at 100 lb. gage).
Pocahontas	7.2 lb. per lb. coal
Pennsylvania (run of mine)	6.6 lb. per lb. coal
Ohio (run of mine)	6.2 lb. per lb. coal
Illinois (run of mine)	5.0 lb. per lb. coal

If the feed water is warmer than 60°, the evaporation should increase 1 per cent for each 10° rise in feed water temperature. A wide variation in steam pressure will not have an appreciable effect on the evaporation.

BUILDING UP BOILER EFFICIENCY.

Boiler efficiency may often be increased by proper attention to firing. Firing should be reasonably frequent, say every 10 minutes, so as not to reduce the temperature by excessive addition of coal. The coal should be spread either over the whole fire or over half alternately, or the coking method should be used. Large lumps of coal should be broken up. The fire should be kept clean, level and of uniform thickness. The range of thickness should usually be between 6 and 10 inches. Thick fires tend toward poor combustion unless a larger draft is used, which often leads to excessive air leakage and lower furnace temperature. Thin fires are difficult to maintain. The care of the fires should be conducted in such a manner that conditions in the furnace will be kept as uniform as possible. While, under present conditions, the small-plant operator has little option in choosing his fuel, it may be pointed out that coal containing a large percentage of fine "dust" is not well suited for hand firing and requires excessive draft. The presence of smoke in any considerable amount or for any length of time indicates that something is amiss in the process of combustion.

Air leaks in the boiler setting, due to cracks or defective masonry, or in the breeching or base of chimney, spoil the draft and may admit large quantities of air which cool the hot gases and interfere with the completion of combustion. If there is difficulty in obtaining sufficient draft, or if the chimney smokes excessively, or the boiler does not make steam as it should, the setting and breeching should be carefully gone over and any leaks found should be sealed.

In order that the heat from the furnace may be transmitted to the water in the boiler most effectively, the boiler tubes and shell exposed to the heat must be clean. This involves the periodic blowing of soot from the outside of the tubes and the turbining or other treatment of the water side of the tubes and shell to remove incrustation and deposits. This is very important, as 1/16 inch of hard scale will decrease the boiler efficiency by about 10 per cent. Soft lime deposits are less detrimental, but reduce the steaming capacity.

It is often the habit of firemen to allow the steam pressure to drop gradually, until it becomes customary to carry a pressure from 15 to 20 pounds below that safely allowed by the boiler inspectors. To do this reduces the mean effective pressure in the engines correspondingly and results in a larger steam consumption. The allowable boiler pressure should be ascertained from

*Sanitary Engineer, with John H. Gregory, New York.

the insurance company, and this should be maintained.

Nothing has been said regarding combustion tests and studies by experts. Such tests will often yield profitable results in the larger plants (pumping 2.5 million gallons per day and upward), suggesting changes in fuel, firing methods, grate design, boiler baffling, draft, etc., which will bring about substantial savings of fuel.

WELL-COVERED STEAM LINES HELP REDUCE LOSSES.

All pipes carrying live or exhaust steam or hot water, as well as boiler shells, feed water heaters and engine cylinders, if not lagged or jacketed, should be covered with a good heat insulator. Pipe covering, to be most effective, must be kept in good repair and free from cracks. Good pipe covering, as above outlined, will conserve from 3 to 5 per cent of the steam consumption of the plant.

IMPROVING PUMPING ENGINE PERFORMANCE.

The steam end of the pumps can best be studied by means of indicator cards. Practically all pumping engines are provided with the necessary piping for attaching a steam indicator and cards can be taken without interference with operation. From these the steam consumption can be computed, and checked against what the engine should use. The indicator cards also show the condition of the valves, as well as leaks, and from the information thus obtained adjustments can be made tending toward reduction of steam consumption. Just as low steam pressure at the boiler will reduce engine efficiency, so also will excessive throttling of the steam valve at the engine. Low vacuum in condensing engines is a frequent source of power loss. Increasing the vacuum from 15 to 25 inches reduces the steam consumption from 8 to 10 per cent. The vacuum can frequently be improved by stopping air leaks in the exhaust piping, renewing air pump valves and packing, or cleansing the condenser tubes of accumulated oil and silt, which reduce its capacity. Sometimes it is merely a question of speeding up the condenser pumps, which can be done without hesitation if the exhaust steam from these pumps is used in heating the feed water.

Considered as an engine, the steam pump has about the same sources of friction loss as any other steam engine, and requires the same care as to maintaining proper alignment of bearings, avoiding excessive bearing pressure and as to lubrication. Outside-packed pumps have another seat of friction loss in the stuffing-box glands of the water end. In pumps of 3 million gallons or less capacity, an unbelievable amount of friction can be created by pulling these up unevenly, or using a wrench on them in the effort to prevent leakage or "spitting" along the plungers.

REDUCING SLIPPAGE.

By slippage is meant the escape of water under discharge pressure into the suction end of the pump, through leaky valves in either the suction or discharge decks, as well as the visible leakage past the plunger and plunger rod stuffing boxes. With careful operation such leakage can be kept down to 5 per cent but often amounts to 25 per cent of the water displaced. It is remedied by replacing worn pump valves and seeing that these close promptly and seat properly and do not stick on the valve stems, and by repacking plunger and plunger rod stuffing boxes. Slippage can be maintained at a minimum by periodic inspection of the valve decks. If there is a Venturi meter in the discharge line, the slippage can be ascertained by the difference between the pump discharge computed from the revolution counter and the quantity of water recorded by the meter for the same period. Also, by pumping against a closed discharge valve, some idea of the slippage can be obtained. If the valves were absolutely tight, the pump would not run with the discharge valve closed—theoretically. If it runs at one-fourth speed, a slippage of 25 per cent is supposedly indicated. Direct-acting pumps are further afflicted with the tendency to "short-stroke"—which reduces their capacity and efficiency and can be remedied by proper adjustment of the steam valves.

RECOVERING HEAT FROM EXHAUST STEAM.

In non-condensing plants an economy of from 10 to 12 per cent can be effected by using the exhaust steam from the pumps to heat the boiler feed water. In plants running condensing, all exhaust steam from vacuum pumps, boiler feed pumps, traps, lighting units, etc., should be piped to a heater, as in this way a saving of from 5 per cent upward can be attained. The efficiency of heaters already in use can often be greatly improved by cleaning and overhauling, coupled with a little scientific attention in their operation.

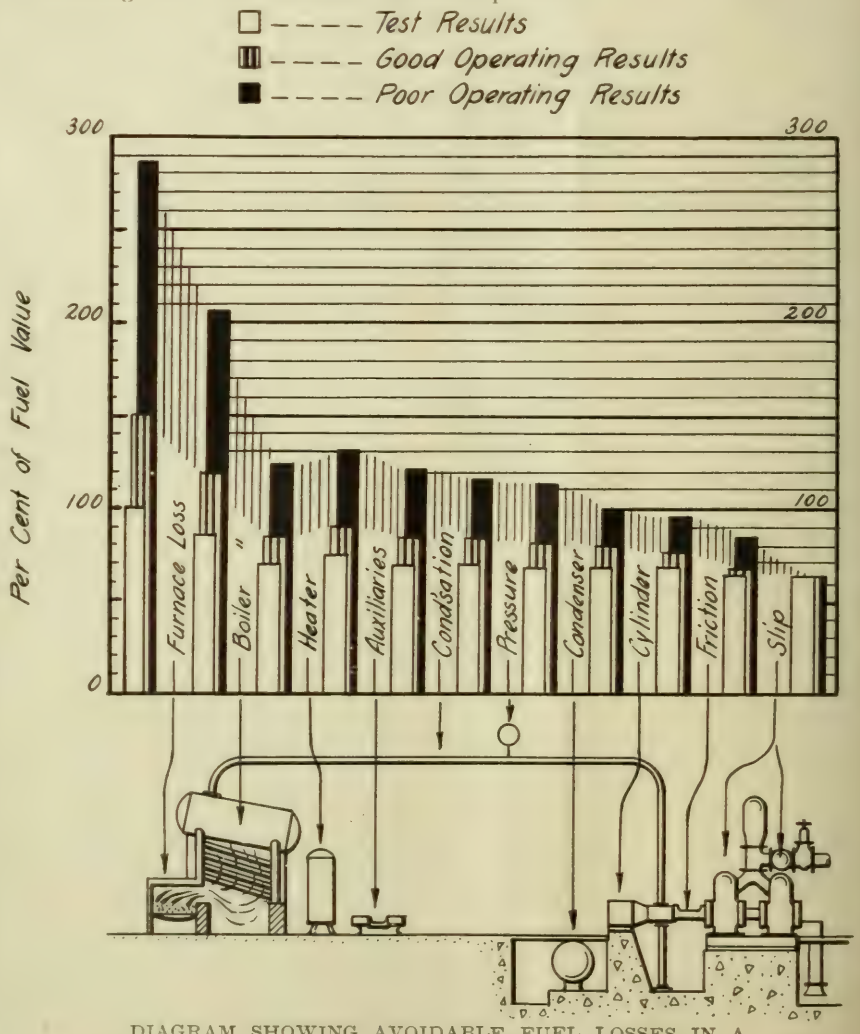


DIAGRAM SHOWING AVOIDABLE FUEL LOSSES IN A STEAM PUMPING PLANT.

EXAMPLE OF SAVING POSSIBLE

It is instructive to apply the various losses above described to a typical case, in order to show their relative proportions, the extent by which they can be reduced, and the saving effected thereby. This has been done in the accompanying illustration. The starting point for the scale of fuel losses is taken as the number of heat units in the coal fired, and the losses are followed through step by step. The shaded area shows the losses which may be eliminated by proper maintenance and operation of plant. These avoidable losses amount to 18 per cent of the coal fired, which for a plant pumping 3,000,000 gallons per day against 100 pounds total head, and with a load factor of 50 per cent, would amount to 1,810 tons per year. At the present prices of say $7 per ton fired, this would mean $12,650 per year. Even with coal reduced to $3 per ton, mine price, and allowing $2 for freight, firing, etc., the saving would be $9,050.

TORONTO'S NEW REFUSE COLLECTION WAGONS.

The Street Cleaning Department of Toronto, Ont., has for some time past been devolping a new type of collection wagon for garbage and rubbish. Their aim was to obtain a wagon with large cubical holding capacity, not repulsive in appearance, having low sides, provision for covering load, back dumping, and to be of light weight and easy-running. These wagons are used for collecting the mixed kitchen garbage and combustible rubbish. The weight of this mixed collection is approximately 450 lbs. per cu. yd.

The old type of collection vehicle was a back-dump two-wheel cart holding approximately 2½ cu. yds. and weighing when empty about 1,150 lbs. This cart had high sides, making the driver lift the receptacles to a considerable height before they could be emptied into the cart. It was also difficult to keep the old carts well covered, and the jolting of them on rough pavements tended to loosen the load and shake off pieces of refuse. When the city was dumping the refuse in ravines and along the lake shore these carts, however, were well adapted to traversing the rough roads over the filled-in areas to the face of the dumps.

The new wagons, shown in the illustration, are of the back-dump, four-wheeled type, with movable body. The body of the wagon is made with an overhang over the wheels, considerably increasing the capacity without increasing the height of the sides. The box is wood, the upper part of the sides being made of wood strips for lightness. The frame is built of steel channels laid flat and reinforced with wood. The box rests on rollers running on the steel wagon frame. When dumping, the lock at the front of the wagon holding the box to the frame is released and the body is pushed backward on these rollers until it overbalances and drops the load. The box is sufficiently light, when empty, to be readily pulled to a horizontal position and forward and locked in place.

Provision for keeping the load well covered is made as follows: Underneath the driver's seat a tarpaulin cover is rolled up on a roller turned by a small hand winch. The drivers are instructed to first fill the forward section of the wagon when collecting refuse and pull the tarpaulin cover over this part of the load. In this manner the load is kept covered as the wagon is being filled up until it is completely loaded. When the wagon is filled the tarpaulin is fastened to catches on the tail board, then pulled taut with the winch. When empty, the cover is neatly rolled up on the roller under the driver's seat and thus cannot be lost or mislaid.

These new wagons have a capacity of 4 cu. yds. when

NEW TORONTO GARBAGE CART

loaded level with the top, but as a matter of fact by heaping the refuse slightly they actually collect approximately 5 cu. yds., this being almost double the carrying capacity of the old two-wheel carts, while the weight of the new wagon is only about 700 lbs. greater than that of the old cart. The old carts in the eastern end of the city average 1,122 lbs. per load, and the new wagons in the same section average 2,325 lbs. per load. The average of a large number of carts and wagons from various sections of the city shows the average load collected by the wagons to be almost 40 per cent heavier than the average cart load.

As one wagon equals two carts, the wages of one driver and the cost of maintenance of one horse and cart are saved. As the drivers in Toronto are paid $18 a week for 50 hours work and the cost of fodder is high, the saving effected by these new wagons will pay for them in a short time. If it had not been for the use of these new wagons, the increased cost of labor, fodder and maintenance due to war conditions would have greatly raised the total cost of collection. As it is, the department is able to continue its collection service with about the same appropriation as in normal times.

The department takes particular pride in these wagons, keeping them clean and well painted, and their appearance on the street when neatly covered is not at all objectionable.

DETROIT WATER DEPARTMENT TRUCK.

The Board of Water Commissioners of Detroit, Mich., has owned a 1½-ton truck for about two and a half years and has had it in constant service since that time. Records kept during the twelve months ending in March, 1917, show that during that time the truck saw 287½ days' service, making 949 trips and 1,852 deliveries. It carried 1,280 tons and traveled 9,958 miles. In this work it used 1,755 gallons of gasoline and 678½ pints of cylinder oil. The ton miles (on the half-load basis) was

WATER WORKS DEPARTMENT TRUCK, DETROIT.

6,605. The average standing time per day was 1 hr. and 43 min.; the average running time per day, 5 hr., 58 min.

The fixed charges, including interest, insurance, driver's wages, taxes and license and garage rent were $1,097.67. The variable charges, including gasoline, lubricants, maintenance, depreciation and tire allowance was $708.01. This gives a total cost of $6.28 per day, 18 cts. per mile, or 27 cts. per ton-mile. The cost in December, 1914, soon after the truck was received, was $7 a day and 20 cts. a mile. The truck is a Federal, Model H.

SOME WATER PURIFICATION EXPERIENCES

Difficulties with Pipes for Alum Solution—Chemical Solution Agitators—Protecting Concrete—Breaking of Tobin Bronze Strainer Plates.

One of the best papers detailing practical experiences that has been prepared for the American Water Works Association for some time was that presented before that society at the last convention by Lewis I. Birdsall, superintendent of water purification at Minneapolis. Mr. Birdsall's paper was a narration of certain difficulties and problems encountered in the operation of rapid filtration plants, and the methods adopted for solving them. In the following article we give in somewhat abbreviated form Mr. Birdsall's descriptions of a number of these experiences.

COAGULANT PIPING.

The writer's experiences covered by his discussion of this subject included those in connection with the filter plant at Rock Island. When he assumed charge of this plant in 1911, a 1½-inch lead-lined iron pipe carried the alum solution about 300 feet to the further end of the coagulating basins, the pipe being laid under the water. About four feet head was available. Because of deposits of alum in the pipe, and also of entrained air, the required amount of solution could not be forced through the pipe by this head. A hydraulic ejector was connected to the line and served to remove the air, but would not remove the deposits in the pipe. Later, leaks developed at the threaded joints where lead did not meet lead in the lining, and also at other points where the lead lining was deficient; and this continued after several lengths of pipe had been replaced.

This pipe was replaced with a 2-inch composition conduit guaranteed to be unaffected by the alum solution. It met this guarantee, but when the water in the basin warmed up in the spring, the conduit expanded and broke at the joints. Expansion joints of rubber hose were inserted which served the purpose until cold weather came, when the conduit contracted and pulled the joints apart. (Recent information from Rock Island is that the fibre conduit is satisfactory when encased in concrete or other suitable material, and when not subjected to extreme changes in temperature.) Both lead and brass pipe were tried, but they clogged with deposits of slimy material. The use of 4-ply rubber hose was suggested by C. R. Henderson, manager of the Davenport Water Company, and this was installed in 50-foot lengths and all troubles ceased. Whenever the hose clogged up it was removed one length at a time, trod upon to loosen the deposits and then flushed out with water under pressure.

In the Minneapolis filtration plant, all coagulant lines were of 2-inch lead pipe with brass couplings, laid with a slope of 1 inch in 10 feet. The lines from the solution pumps to the overflow tanks which supply the feed controllers gave little trouble, but the gravity lines from the controllers soon began to clog. In 1914 it was decided, when making additions to the original plant, to use open troughs for carrying the coagulant on horizontal runs in place of lead pipe. Both open tile laid in concrete and a concrete channel were considered, but finally iron was used, again at the suggestion of C. R. Henderson, and has solved all difficulties formerly experienced. It is readily accessible for cleaning and for painting several times each year with a high grade of graphite or asphalt paint. No leaks have occurred in this pipe during the three years it has been in service.

The high cost of brass has led Mr. Birdsall to use iron flangles instead of brass for connecting lead pipe to lead, or lead to rubber hose, on the discharge lines from the coagulant solution pumps. The iron flange is pushed onto the lead pipe and the end of the pipe is then expanded with a mandrel and bent over the flange so that a lead-to-lead coupling is obtained at slight expense.

CHEMICAL SOLUTION AGITATORS.

The agitating device was of the 2-blade impeller type, driven by a 3-inch by 13-foot hollow vertical shaft, direct connected to a 2-h. p. motor making 1,720 revolutions a minute. This high speed produced excellent agitation, but caused the drive shaft and armature shafts in the motor to bend. There was also much trouble from corrosion of the steel shafting and bronze thrust bearing.

The speed of the agitator was reduced to about 600 r. p. m. by means of reduction gears and the 6-inch impeller blades were replaced with wooden blades 3 feet long and steady bearings were fixed at the center of the vertical drive shafts. These changes eliminated some of the troubles, but not the corrosion. Also the agitators were very noisy, the motor having been set on a steel deck supported by I beams over the center of the tank. Further change was then made by replacing the hollow steel shafts with 4x4 square oak shafts; also the three vertical motors with one horzontal motor of 2 h. p. and 1,120 r. p. m., which speed was reduced to 10 r. p. m. at the impellers by shafting, clutches and worm drive. The blades of the impellers were lengthened so as to reach to within 6 inches of the sides of the tanks. As finally constructed, the results are very satisfactory, the noise being entirely eliminated, one motor doing the work of three, and there being no more trouble with shafts or impellers.

PAINTING CONCRETE.

The inside surfaces of all concrete chemical solution tanks are kept well covered with a good grade of asphalt or graphite paint, it having been found that the alum solution was dissolving the limestone aggregate and otherwise decomposing the concrete walls of the tanks. Graphite paint seems to give better service than asphalt, as the latter gradually dissolves off. A new paint known as Frost's Kapak Special Acid Resisting Paint appears to give as good results as does the graphite and is somewhat cheaper.

TOBIN BRONZE TROUBLES.

The strainer plates in the filter bottom had been made of Tobin bronze, and the filter had not been in service two months before breaks began to occur in these, finally becoming so frequent that it was necessary to remove all of the center strainer plates from all the filters. (A brass wire screen had been bolted to the ridge blocks to hold the gravel down, but this became such a nuisance at this time that it was removed altogether and the depth of gravel increased to 13 inches, with a new size of 1½ to 2 inches added. The filters have been found to wash better without the screen.) Most of the breaks were in the center plates, which were supported by yokes from above the plates, and it was thought probable that the design of the center plates was at fault. Each sound center plate was then reinforced with ⅛-inch sheet brass riveted longitudinally along the center line of the plate,

but many of the plates reinforced in this way cracked along the edge of the brass strip.

Tests of the Tobin bronze made on strips cut from the plates that had failed seemed to show that the metal met the original specifications. The breaks continued with such frequency that it became difficult to keep enough filters in service to supply the city with water. Heavier plates of Tobin bronze were then made, containing holes 3-32 of an inch instead of 1-16 of an inch, and reinforced with bronze ribs. These were placed in one filter unit but the breaks continued to occur in both the plates and the bolts used for fastening them in place. Laboratory tests made upon the strainer plates seemed to indicate that temperature changes, electric current and the water had no effect upon the metal, and the mercuric chloride test was applied without any result. The company making the plates and bolts then suggested that possibly the cold working of the metal in making it into plates and bolts might have caused a re-arrangement of the molecules, and suggested annealing them. Enough plates and bolts for one filter were heated in a furnace to a cherry red for one hour and then removed and cooled slowly. These plates and bolts have given good service, and no breaks in them have occurred; consequently the rest of the plates and bolts that were sound were annealed in the same way and replaced in the filter, and only a few scattered failures have occurred since.

The medium brass plates and bolts installed in the filter have shown no failure whatever. Monel metal plates and bolts had been used in one filter and these have shown no failures, but all the troubles were confined to Tobin bronze. The United States Bureau of Standards investigated the matter and their conclusions were that the cold working of the metal and too little attention paid to annealing caused considerable internal stresses, which were responsible for the above failures. (This conclusion was reached partly by investigation of similar troubles which had been experienced with bronze parts used in connection with the Catskill aqueduct, as described in Municipal Journal for December 24, 1914.) Mr. Birdsall thinks it probable that hereafter Monel metal will be used for strainer plates and bolts at the Minneapolis filtration plant.

SOURCES OF WATER SUPPLY IN THE UNITED STATES.

The data concerning water supply obtained from about 800 cities and published in Municipal Journal in the May 3d and July 5th issues, give for each of these cities the source from which the water supply is obtained. The source can, in practically every case, be classified as being either from wells and filter galleries, from springs, from rivers and other large streams, from impounding reservoirs and mountain streams, or from lakes. We have combined the figures for the cities in each of several geographic divisions of the country, and determined the percentage of cities in each division drawing its supply from each of these sources. The geographic divisions used are as follows: New England, Middle Atlantic States, East North Central, West North Central, South Atlantic, East South Central, West South Central, Mountain, and Pacific.

Taking first the entire United States, we find that 43.4 per cent of all the cities reporting obtain their supply from wells, or, in a few cases, filter galleries. Rivers and creeks form the source of supply for 21.5 per cent; impounding reservoirs and mountain streams for 18.1 per cent; lakes, 19.7 per cent, and springs for 7.3 per cent.

In New England the percentage from each of the several sources is as follows: impounding reservoirs and mountain streams, 31 per cent; lakes, 24.8 per cent; wells and filter galleries, 22.1 per cent; rivers and creeks, 16.8 per cent; springs, 5.3 per cent.

In the Middle Atlantic states the percentages are as follows: impounding reservoirs and mountain streams, 32.6 per cent; wells and filter galleries, 26.7 per cent; rivers and creeks, 19.9 per cent; springs, 12.8 per cent; lakes, 7.1 per cent.

In the East North Central states the percentages are as follows: wells and filter galleries, 63.7 per cent; rivers and creeks, 15.3 per cent; lakes, 13.7 per cent; impounding reservoirs and mountain streams, 4.7 per cent; springs, 2.6 per cent.

In the West North Central states the supplies are from wells and filter galleries in 60.6 per cent; rivers and creeks, 22.8 per cent; impounding reservoirs and mountain streams, 6.1 per cent; lakes, 6.1 per cent; springs, 4.4 per cent.

In the South Atlantic states wells and filter galleries, 37.5 per cent; rivers and creeks, 36 per cent; impounding reservoirs and mountain streams, 15.6 per cent; springs, 10.9 per cent; lakes, none.

East South Central states, wells and filter galleries, 45.3 per cent; rivers and creeks, 23.8 per cent; springs, 19 per cent; impounding reservoirs and mountain streams, 9.5 per cent; lakes, 2.4 per cent.

In the West South Central states, wells and filter galleries, 46 per cent; rivers and creeks, 24.3 per cent; impounding reservoirs and mountain streams, 18.9 per cent; lakes, 5.4 per cent; springs, 5.4 per cent.

In the Mountain states, rivers and creeks, 41.9 per cent; impounding reservoirs and mountain streams, 32.3 per cent; wells and filter galleries, 16.1 per cent; springs, 9.7 per cent; lakes, none.

In the Pacific states, wells and filter galleries, 41.2 per cent; impounding reservoirs and mountain streams, 27.4 per cent; rivers and creeks, 21.6 per cent; springs, 5.9 per cent; lakes, 3.9 per cent.

ADVERTISING PAVING IN CHICAGO

Paving Contractors of That City Conduct Campaign to Promote Confidence of Taxpayers in Paving Work and Stimulate Further Paving Work.

A novel kind of advertising has been conducted in Chicago during the past four months, the object of which has been to give the people more confidence in the paving work done by that city and in the paving contractors who do it. One purpose of this was to combat the effect of a paving report made by a citizen organization last year, which had caused a great many of the citizens to feel that all paving work done in the city had been skimped in quantity and poor in quality. Incidentally it was hoped that the effect of the advertising campaign would be not only to give the people confidence in the paving work already done and in the paving contractors, but also to secure, as a result of this, a demand by the property owners for more paving work this year than it seemed probable last winter that the tax payers would endorse.

The advertising was conducted by the O'Shaughnessy Advertising Company, and was financed by twenty of the leading paving contractors of Chicago. Two-column and three-column ads were placed in all of the daily papers printed in the English language in the city, calling attention of the property owners to a small book on paving which had been prepared and published for the purpose. In each of these advertisements the names of the twenty contractors appeared, as those of "established, responsible and well-known firms," who had done paving in the city in the past and were prepared to continue doing so in the

future. In many of them not only were the property owners requested to send for copies of this booklet and a brief statement of its contents given, but paragraphs similar to the following were included: "The city paving inspector present on the work always has the specifications in his pocket. Ask him to show them to you. He will gladly do it. You can read the specifications, verify the inspection and be a volunteer paving inspector for your own protection and your own satisfaction." These advertisements were printed in large display type, so that they were sure to attract attention. Reference was also made to the guarantee clauses in the paving contracts, and the high degree of protection given to the property owner.

The Board of Local Improvements was furnished with copies of the booklet, which it gives out to property owners seeking information on paving matters, and the various paving firms use it in promotion work and in localities where work is under way. If they learn that a property owner is finding fault with anything in connection with the work, copies of the book are handed to him and to his neighbors.

The advertising was done on the general principle that a paving firm is a business with service and commodity to sell. The people who pay the bills are his customers and it is best for all concerned that they should know and have confidence in him. Unfortunately, the property owner sees only the laborers and foremen on the work, frequently not even knowing the name of the firm who is laying the pavement for which he ultimately must pay. It is believed that this method of advertising will introduce more personal and cordial relations between the property owner and the contractor and will permit the latter to give such information and explanations as will head off or quickly allay any criticisms which may begin to be circulated among the property owners along a given piece of work.

The booklet contains 24 3½ x 6-inch pages, the material in which is classified under the following headings: Value of Street Paving; Purpose of Paving; Problems in Paving; What Constitutes Good Paving; Traffic Problems; Damage by Big Trucks; Intensified Traffic; Heavy Street Cars; Kind of Paving Laid in Chicago; Guaranteed Paving; Inspect Your Own Paving; How to Inspect Paving; Testing Paving Material; How to Get Your Street Paved; How Paving Bills Are Incurred and Paid.

Explanations and descriptions are all in popular language and every citizen with any intelligence can learn from this booklet in what way the pavement is guaranteed, how the standard Chicago pavements are supposed to be laid, how the materials are tested in the city laboratories and some of the points to be looked after in inspecting the pavement. If any considerable number of the citizens take the last instruction to heart, we question whether it would continue to be true that the inspector "will cheerfully show the specifications to you on request," as he might easily be kept busy doing so; and in fact, it is readily conceivable that so much of his time might be occupied in this way that his inspection duties would be sadly neglected. The last two items explain exactly what a property owner should do if he desires to have the street in front of his property paved, and also just how the assessment role is made up and the money collected.

SECURING ROAD MATERIAL DELIVERY.

Materials intended directly or indirectly for war purposes now have precedence in transportation by railways, and some road repairs or construction of great importance to the public may be held up by the impossibility of obtaining the delivery of material necessary for this purpose. It is suggested, where this is the case, that the state highway department be requested to approve an application that such material be forwarded, such application to be made to the Commission on Car Service of the Railroad Committee of the Council of National Defense at Washington, stating the special urgency of this case. Endorsement by the state department will probably carry considerable weight.

BUILDING THE CANTONMENTS

Some Details of the Individual Cantonments—Engineering Work at Camp Ayer—Topographical Surveying—Water Supply—Sewerage.

(*Continued from page 25.*)

While in a general way the cantonments have been standardized to a uniform construction, the general layout is different in practically every case, depending on the topography, including the elevation of the land, location of rivers, railroads, highways, etc. For instance, in Battle Creek the entire group of buildings is to be laid out in one large rectangular area, surrounded by a highway from which branch roads run into the grounds at right angles every few hundred feet. The buildings in general are arranged in groups down the two longer sides of the rectangle and across each end, while a considerable area in the middle is reserved for drill and other purposes. This cantonment occupies an area of about 780 acres, and is estimated to provide for 28,000 men.

The American Lake cantoment, located near Tacoma, Wash., is on the Pacific Highway at Dupont Station, and covers approximately two square miles. In this case, also, the ground occupied by the buildings is approximately a rectangle, although the longer sides are slightly curved. On the north side of the area are the buildings for accommodating regiments of infantry and field artillery, on the south those for the infantry, field artillery and general hospital, on the west side the buildings of the balloon and telegraph companies, and on the east those of the aviation companies. Spur tracks from the Northern Pacific Railroad surround this area outside of the buildings on three sides. North of the northern spur are buildings for the engineers' trains, supply trains, sanitary trains and ambulances, and division ammunition trains. At the south of the general area are the offices. For constructing this American Lake cantonment, a special contracting company was organized, known as the Hurley-Mason Company. Some idea of the amount of work to be done is indicated by the fact that this construction company has organized departments of auditing, buildings, roads, sewers, water, labor and purchase; in addition to which there will be a number of sub-departments, including bookkeeping, time keeping, plant and stores. Work was begun on this cantonment on June 25th. Work on the New Jersey cantonment began about the same time. The New England cantonment at Ayer, Mass., also began about June 25th. In each of these cases the first work was a general clearing of at least a portion of the site of underbrush and other obstructions, and erecting buildings for accommodating the thousands of laborers that are employed. As an illustration of the number of buildings to be constructed, in the American Lake cantonment there will be required 768 buildings for infantry, 192 for field artillery and about the same number for the aero and balloon units, 40 buildings will be used by the hospital and sanitary detachments, and 50 will be for miscellaneous purposes, 7 of these being for the Y. M. C. A.

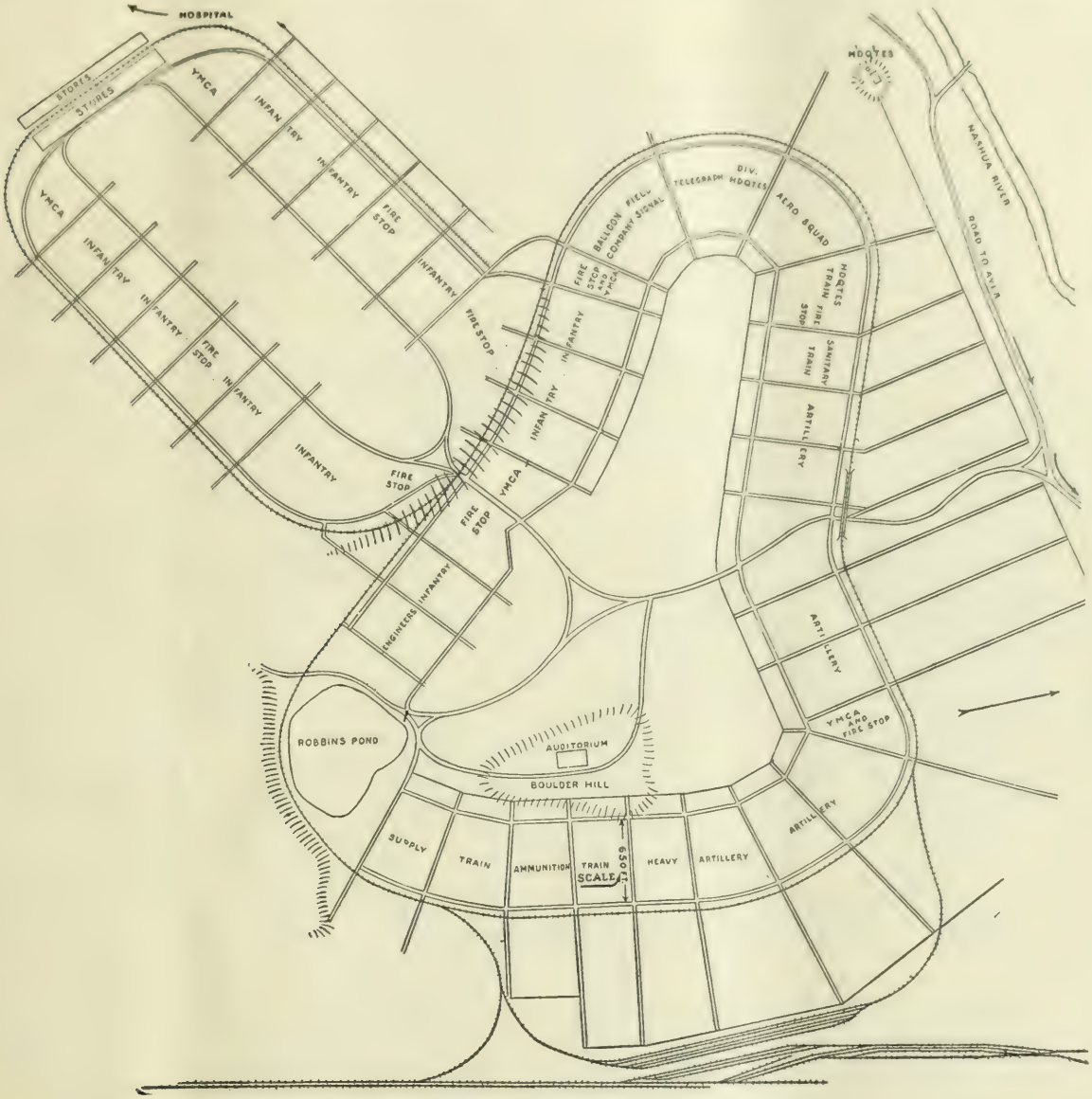
The general work of construction is remarkable chiefly for the enormous scale upon which it is being done, rather than for any unique features in connection with any individual building. The engineering work connected with cantonment construction, however, will be of inter-

est to municipal engineers, and that performed at Camp Ayer may be described briefly as follows.

It was not until early in June that the Government signed leases for the property to be utilized at Ayer for the cantonment and until then no work whatever had been done toward even preparing a general layout of the buildings. The total area taken over is nearly 7,000 acres, about 2,500 of which is to be used for the buildings themselves, another portion of the area for procuring a ground water supply, another for the hospital and still another for a sewage disposal grounds. The property lies along the Nashua river for about 4 miles. The camp is about one hour by rail from Boston, or

The problem was put up to these engineers about June 8, and not an hour was lost in getting to work. Within two weeks the surveyors and engineers working under them had made the survey and plotted a topographic map covering 2,500 acres on a scale of 200 feet to the inch and showing contour lines at 10-ft. intervals. The quartermaster's department had already prepared and supplied designs for buildings, and it was up to the engineers to arrange these buildings within the area provided so as to secure the maximum of efficiency and convenience.

As soon as the topographic map was sufficiently advanced, a general layout of buildings and roads was made.



LAYOUT OF THE AYER, MASSACHUSETTS, CANTONMENT.

troops could reach that city on foot in one day, should an attack of the enemy or other emergency demand their presence there. On the other hand, it is too far from the big city to enable the soldiers to go there for pleasure in their off hours. It is also accessible by several lines of railroads, thus facilitating the bringing of materials for construction and later for the maintenance of the men, and also enabling the force to be sent to any part of the country, should this be desired. The work is in charge of Captain Canfield, a West Point graduate, assisted by a board of three voluntary engineers without commissions, acting as advisors, these being Frank A. Barbour, Frederick P. Stearns and Herbert J. Kellaway.

The survey crew was divided into sections, one of which made a more accurate topographic survey from which were located contours at 2-ft. intervals. Another section began running out the road lines that had been sketched in on the preliminary map. Other engineers started work on the water development, still another corps on the sewerage, and one laying out the 14 miles of railroad track that will be required inside of the camp itself. Other engineers were set to staking out the houses as located on the map. At this writing, just about four weeks from the time the problem was presented to the engineers, practically all of this preliminary work has been completed. The railroad referred to is considered

essential to the rapid completion of the work. It will leave the Boston & Maine siding, which is located on the east side of the cantonment, and extend around the perimeter of the entire construction area and return to the siding again, thus enabling a train to carry car loads of material, dropping each load where needed, and return to the main line without retracing its course. It is possible that this track will be retained after the completion of the cantonment for handling the food and other stores required, since about 225 tons of such material will need to be handled every day while the camp is in commission. It is proposed to train about 40,000 at this cantonment, in addition to which there will be about 12,000 horses and mules to feed.

Certain of the construction details are interesting, as showing how the work is being expedited. For instance, portable gasoline saw mills are used for cutting boards and lumber to length. A car load of lumber is dumped by train or auto truck within a few feet of where a building is to be erected, the portable saw mill is set between the pile of lumber and the building and, with practically one handling, boards and timbers are carried from the pile to the saw mill and directly from the saw mill to be put into place in the building. It is stated that at one of the cantonments a building 25 x 220 feet was erected complete in 90 minutes. In Ayer the contractor in two days built ten one-story bunk houses for the laborers, each 16 feet wide by 110 feet long, with composition roofs and divided into 26 rooms. Two hundred carpenters and 125 laborers were used. At that time the portable saw mill was not on the ground, so that all sawing was done by hand. Fifty thousand feet of lumber and 1,200 rolls of roofing were used in the construction.

All the compounds will be served by 25-foot streets passing along both the front and back of the compound, which will average 400 x 600 feet. In addition to these there is a main thoroughfare leading with easy grades from the town highway into the cantonment, with branches to each of the several sections thereof.

The water supply demanded is estimated to be about 2,000,000 gallons a day. Surface water is not used, although there is quite a little in the vicinity, on account of its questionable character, but a supply is obtained from the morainal material nearby by means of wells. A test well was pumped at the rate of a million gallons a day for ten days, and a study of the results indicated that the desired supply was safely available. For the actual supply, a well will be dug 30 feet deep and 50 feet in diameter, which will be used as a collecting well and also as a suction well. If necessary, auxiliary driven wells will be provided, siphoned into the main well. From this well water will be pumped to four elevated tanks, each with a capacity of 100,000 gallons, from which it will be distributed through a system of pipes circulating throughout the cantonment. It is estimated that the cost of the water system will be about $100,000.

The sewage will be carried through vitrified pipe to the extreme northern limits of the government property, something more than a mile beyond the camps. At this point there is a large gravel area, 20 acres of which will be laid out as sewage filtration beds. These cannot be reached by gravity, but the sewage will need to be pumped onto the surface at this point. The pumping for both water and sewage will be done by electrically operated pumps, the power for this purpose and for lighting the camp being provided under contract by the New England Power Company. It is estimated that 200 k. ws. will be used for pumping and 1,800 for lighting the cantonment.

Each of the several cantonments has interesting features of its own connected with its construction or operation. For instance, the sewage from Camp Wilson, a short distance from San Antonio, is to be taken into the sewerage system of that city, and owing to the topography it will be necessary to pump the sewage in order to effect this. The city has offered to provide the pumping plant at an estimated cost of $25,000. The cantonment will be served by two sewer mains which will unite inside the city limits and one pumping plant at that point will raise the sewage collected by both of them, the lift required being approximately forty feet. An automatically operating pumping plant is proposed.

The electric lighting is being arranged for generally with local electric companies. For instance, the Des Moines Electric Company has arranged to furnish current for Camp Dodge, which is about eight miles from the company's nearest high voltage circuit. A transmission line of that length is being or has been constructed, which will transmit energy at 13,200 volts to the cantonment where three 350-k. w. transformers will step it down to 2,300 volts for distribution through the camp grounds. The allied contractors of Des Moines have pledged their resources and stock in the general construction of this cantonment, which is to be constructed under the charge of one of them.

At Petersburg, Va., the Virginia Railway & Power Company proposed to rebuild about three miles of 4,000-volt line, so as to bring it up to a standard for 13,200 volts, and build a new extension of two miles to the center of the camp. The source of supply is a hydro-electric generating station just west of Petersburg, and a 33,000-volt transmission line from the Richmond power house. It is proposed to install three 1,000-k. v. a. 33,000-volt to 13,200-volt transformers at the camp.

At Junction City, Kansas, the Union Light and Power Company has furnished electric energy to Ft. Riley for several years. A cantonment is to be constructed at the Fort and the power company will furnish current for it also. It has a duplicate 2,300-volt, 3-phase, 60-cycle transmission line to the reservation from a power house four miles away, the line having a rating of approximately 600 k. w. In addition to this it has a 33,000-volt transmission line from Junction City and the hydro-electric plant at Rockyford, which is reinforced by a 750-k. w. Allis-Chalmers turbine to be used at low water stage. One-half of the cantonment will be supplied from the 2,300-volt line and the other half from the 33,000-volt line. An interesting incident is said to have occurred at Linda Vista, Cal., when trouble developed in the electric lighting system that shut off all power temporarily, during which time a Kissel truck was attached to the dynamo by a belt and operated it until the regular power was restored.

The descriptions already given and the work now under way refer to sixteen wooden cantonments, but the war department states that this is only half of the provision to be made for the soldiers. Steps are being taken to build 16 cantonments of tents to receive the national guardsmen when they are called to the colors. Work has hardly begun on them as yet, because it can be completed much more quickly than the wooden buildings.

These camps will be laid out to accommodate approximately 35,000 men each, and possibly as many as 10,000 horses and mules. So far as the construction of water and sewerage systems and the erection of wooden kitchens, mess halls, hospitals and store houses are concerned, the plans for these tent cantonments will be practically the same as those for the wooden ones.

Among the miscellaneous buildings to be provided, there will be in some of the cantonments, if not all, library buildings, the libraries to be provided by the American Library Association, according to a vote of that association at its recent annual meeting.

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IMPORTANCE OF OPERATION.

Technical papers and technical literature generally are full of descriptions of plans for engineering structures and plants, and articles dealing with construction methods are now more or less common; but details of operation are seldom made public. And yet efficiency in operation and maintenance is fully as important a factor in the economy and general satisfactoriness of a plant or public utility as is either designing or construction—in many cases even a more important one. The reasons for this paucity of public information on the subject are many—diffidence of those who have charge of operation in regard to preparing papers or articles, and failure to keep anything like complete records of operating details are two of the most important.

As a result, papers giving definite information on this subject based upon actual experience are of special importance. One such is published in this issue, dealing with the operation of the Minneapolis water purification plant, and another detailing experiences with another similar plant will be given in a week or two. These, as well as one published in Municipal Journal a few weeks ago, suggest that the details of piping for the chemicals used in such plants, as ordinarily designed and carried out, are far from satisfactory. This furnishes an excellent illustration of the importance of operation experiences in suggesting improvements in construction details.

But even more important is the improvement that composite experience makes possible in operation of such plants. Another article in this issue, discussing pumping station methods and economics, illustrates this. The use of feed water heaters, economizers, etc., may not always be advisable in small plants where coal is cheap, since their installation and maintenance add to the cost. But proper firing, keeping steam pipes tight, pump valves working properly, and in general keeping the plant keyed up, costs practically nothing but faithful attention and intelligence on the part of firemen and engineers, who must be employed in any event. Such efficient operation should be secured in very plant as a matter of general economy.

The degree of efficiency should be made evident by sufficient records of operating details, for it cannot be expected that any employee or group of employees will continue to work with the greatest possible efficiency if there is nothing to show their employers whether or not this is the case, or even to prove it to themselves for their own satisfaction. This is one of the greatest advantages derived from adequate records of operation of any plant or utility, and is of itself well worth all trouble involved in securing such records.

SOURCES OF WATER SUPPLY.

The effect of geology and local sentiment in determining the source from which a community draws its water supply is illustrated by figures given elsewhere in this issue. These show, for example, that wells furnish the supply for more than forty per cent of the cities in the entire central part of the country and on the Pacific coast; while mountain streams and impounding reservoirs have been adopted as the sources of supply to a greater extent than any others in the cities of New England and the Middle Atlantic states, and to a large extent in the Rocky Mountain district and the Pacific states. It would be interesting to study the conditions that have caused this choice of wells for a supply in such a large percentage of the cities of the country—nearly one-half of all of them.

PUBLIC WORK IN WAR TIME.

The entrance of the United States into the war has affected general business much less than many feared it would, and we believe that it is improbable that the drafting of 600,000 men will have any more disturbing effect on any work or business of a municipal nature. There have had to be readjustments and changes in men and methods and more such will have to be made in September; but we can see no reason why prices of either materials or labor should advance any further and the reasons for carrying on public work are being more generally recognized.

In support of our views we quote below from an editorial by Frank R. Cook in "The Improvement Bulletin" of Minneapolis, circulating widely in the northwest.

During the coming year—and probably during the entire period of the war if it should unhappily drag out for three or four years before victory finally alights upon the banners of America—the war will only partly absorb the industrial capacity of the nation. Granted that two million or even three million men enlist in the American armies. There are more than one hundred millions of us in America. There are about thirty million male workers of adult age. Probably not more than 6 per cent of the working force of the nation will be enlisted in the ranks. Our factories will be speeded up to produce war munitions, but the production of munitions in the past two or three years has been very great, and it is not likely that the working force will be augmented sufficiently to materially affect the total working power of the nation.

To permit the industries of the country not directly related to the prosecution of the war to remain stagnant during the period of the war would bring distress to a very great proportion of the population. This distress would come during a period of high prices and value inflations, that would rapidly absorb the savings of the days of peace. Money that should go into Liberty bonds would

be withdrawn from the banks to buy necessities of life. The people of America must first and foremost prosecute the war with unflagging energy. War needs must be the first to be met. Every farm must produce as large an acreage and yield as bountiful crops as possible. People must economize on foodstuffs. They should eat less wheat flour and more corn meal.

After the immediate war needs of America are met the surplus energy of the country should be devoted to carrying on the public and private work of developing the country. Where new schools are needed they should be built. Where new water and sewer systems are required they should be constructed. Drainage and irrigation projects should be carried to completion; they are measures that will increase the food supply of the nation. Officials of the state highway commission of Minnesota have earnestly advised public officials of the state to continue the building of good highways with unflagging energy. They point out that every added good highway helps to solve the transportation problem. The money expended in public work goes to the people. It is used to feed and house and clothe the people. It gives added purchasing power to the people.

WATER WORKS MANAGEMENT IN AKRON.

The Bureau of Municipal Research of Akron, O., has been operating for something over two years, and its report concerning its second year's work shows its activities to have covered a study of and proposed improvements in that city's accounting, public welfare, and public works of various kinds. Several of the proposed changes were adopted by the city officials, among them those relative to the management of the water works. The report concerning this last was as follows:

When the present administration took office, it proposed among other things to place the waterworks on as nearly a self-sustaining basis as would be possible.

To that end the Superintendent of the Water division prepared a report to the Service Director outlining a plan and suggesting proper rates to accomplish the task. To that plan the Bureau took some exceptions, both as to suggestions offered and factors omitted.

Thereupon at the request of the Service Director and the Mayor, the Bureau prepared a statement of factors that it felt should be included as elements in any proposed increase in water rates. They were the following:

1. The metering of all services as early as possible to provide a constant check and guide to the amount of water used and the revenues that might reasonably be derived therefrom.

2. Each bond issue to be figured separately in determining the effect of interest and sinking fund charges upon water rates. For sinking fund items, amortization tables should be used.

3. The inclusion of all elements in the problem, i.e., mains in the ground and the old plant as well as the new.

4. A longer life than 30 years to be given certain parts of the plant.

5. Known additions within that life, e.g., new force main, booster pumps and high pressure districts, etc., must be considered.

6. The plant to be given a normal rate of growth in main extensions, new services, general operating costs and growth in revenues.

7. Increased consumption both by factories and by increase in population must be taken into account in determining cost of delivering water.

8. Operation expense must either include main extensions, new services, new meters, etc., or be figured as a separate factor.

9. Allowance to be made for public use of water and this charge placed annually on the tax duplicate to be paid out of taxes by the city at large.

10. To verify the accuracy of any given charge per thousand cubic feet, there should be known the number of users of water at the varying rates.

The above factors were accepted and the Bureau requested to prepare a statement of the information needed. Tables were prepared showing the amount of interest and sinking fund charges on outstanding bonds, on proposed extensions and additions to the plant covering the next 10 years, and a statement of the growth in revenues and expenses of the plant since city operation began, with an attempt to forecast the future.

The result was the adoption of the rates now in effect which will, within the period of 10 years allowed, make the plant self-sustaining and begin the building of a small surplus. Two factors only can alter that result. They are—the unnatural increasing of operation and maintenance costs and the change in the plan accepted for plant extensions.

The Bureau worked out a rate scale by means of which the billing of quarterly rents is made very simple. The card shows at a glance the exact charge for any quantity of water; thereby time in billing is reduced and accuracy insured.

SERVICE TESTS ON BRIDGE PAINTS.

In order to make a study of various bridge paints on the market, the Iowa Highway Commission painted 116 test panels in 1914, using different combinations of commercial paints, and increased the number to 138 in 1915. These panels were exposed to the weather and inspected carefully. The following tentative conclusions have been drawn from these tests:

Of all paints used, the coal tar paints have proven poorest. In no case has a coal tar paint continued to protect completely the panel from corrosion for more than 18 months. All paints in this class failed. The only remedies in the field for a failure is complete removal of all paint by burning and scraping, and repainting with a good oil paint or frequent repainting with the same paint, being very careful to brush the paint out well.

The asphaltic paints, as a class, crack and check considerably, but no evidences of rusting are apparent. The red leads fade and in some cases check, chalk and crack. It is advisable to use these paints only in connection with a more stable paint.

The sublimed white leads check somewhat and show a tendency to rust in the cracks. Structures painted with this class of paint should be watched closely to prevent this early rusting from progressing too far before repainting. The sublimed blue leads check slightly, but to a less degree than the white.

The best grades of iron oxide paints are standing up very well. Iron oxide paints, however, which contain calcium sulphate or calcium carbonate show occasional signs of dissolution, leaving pit holes in the paint film.

Where the graphite and carbon paints are placed next to iron, there are evidences of rusting. When used as a second coat, over a prime coat of first quality iron oxide or lead, these paints are very serviceable. Zinc chromate or lead chromate paints have shown up exceedingly well.

In addition to the study of the behavior of the paints on the test panels, field inspections have been made on a number of bridges. The results of these inspections substantiate the findings by tests and the requirements of the Iowa Highway Commission's paint specifications.

The WEEK'S NEWS

State Road Litigation in Oregon and Michigan—Army Health at Home and Abroad—End of Kansas Natural Gas Case—Sweden Cuts Use of Gas and Electricity—Millionaire Police Chief Fights Vice—City Manager Plan Again Unconstitutional in New York State—Portsmouth Loses Its City Manager—Companies Fight for Six Cent Fares in Massachusetts and New York State—The Niagara Car Wreck—Municipal Markets in New York State.

ROADS AND PAVEMENTS

Lincoln Highway Proposed for Federal Road.

Washington, D. C.—A bill has been introduced in the House by congressman A. R. Broadbeck of Pennsylvania calling for the designation of the Lincoln Highway connecting New York and San Francisco as a federal post road. As printed and referred to the Committee on the Post Office and Post Roads, the bill reads, "That the Postmaster General be and he is hereby authorized and directed to designate as a post road the highway now known as the Lincoln Highway as now laid out from the place of its commencement on the Atlantic seaboard to the point of its termination on the Pacific coast." Congressman Broadbeck introduced the bill as a vitally important measure in the face of the emergency now existing and is prepared to press its consideration both in the committee and on the floor of the House. He urges the necessity of taking immediate steps to put the entire Lincoln Highway in first-class condition. It is understood that Senator Penrose of Pennsylvania will introduce a bill providing federal aid for a proposed military highway connecting Washington with New York by way of Philadelphia and Baltimore at a cost of $25,000,000. The Lincoln Highway and a part of this route coincide.

Untangling Oregon's Road Finances.

Salem, Ore.—By issuing bonds under the recently passed Barrett bill the entire fund to match the Federal appropriation for the post roads under the Shackleford act will be raised in Oregon. This is the decision handed down by the supreme court in an opinion written by Justice Moore. The opinion was rendered as the result of a friendly suit brought by the state highway commission against the state board of control to settle the legal question involved, and the court orders a peremptory writ of mandamus to be issued directing the board of control to issue the bonds in such amount as may be required to meet the federal appropriation. On account of the conflicting bill and the $6,000,000 bonding bill, there was doubt as to whether bonds should be issued for the entire amount to match the federal funds. It was provided in the Bean-Barrett bill that bonds were not to be issued until after the money in the state highway fund had been exhausted in matching the federal appropriation, while the $6,000,000 bonding bill provided that the money for matching the federal fund should be obtained by issuing bonds under the provisions of the Bean-Barrett bill. It is held by the court that the provisions of the Bean-Barrett bill relating to what must be done before the bonds shall be issued, are impliedly repealed by the later enactment. The court in its opinion points out that chapter 237, creating the state highway commission, designates the order in which the highway fund shall be used, which is: (1) To meet the payment of salaries and expenses of the state highway department; (2) to cover the costs of operating and maintaining state highways which have been constructed or improved; (3) to match the federal appropriation; the remainder, if any, to be used for the purposes of that enactment. The court's opinion says: "The reservation of these several amounts impliedly amended section 2 of chapter 175 by deducting the quarter mill tax levied for state road purposes the various sums to be set aside in the order stated." It is pointed out that the $6,000,000 bonding bill sets aside the fund to be derived from motor vehicle licenses for the payment of interest on the bonds, and states that the highway commission, in locating state highways, at the request of the counties, and establishing grades and submitting specifications for their construction as required by chapter 237, together with the operation and maintenance of the highways already constructed, will require an outlay of $244,590 in 1917, while there is in the state highway fund only $238,535 as proceeds from the one-fourth mill tax. Thus there will be no funds left available for matching the federal appropriation without issuing bonds, so it is pointed out by the court. "There can be no reasonable doubt," says the court, "that the sale of bonds in an amount sufficient to raise money to meet that appropriation for the year specified devolves upon the defendants."

To Eliminate Macadam Pavements.

Providence, R. I.—A radical change in the city's street paving policy has been agreed upon by officials, with the result that streets now having a permanent pavement, although their condition may not be excellent, will not be repaved until permanent surfacing has been provided for a number of heavily traveled main arteries which now have a water-bound macadam top. The proposed change means the end in this city of water-bound macadam street surfacing, except in the case of short, lightly traveled side streets. This type of pavement, formerly considered the cheapest, because of the low initial cost, has, with the development of automobile traffic, actually come to be the most expensive kind of street surface that can be laid, officials declare. Walter F. Slade, commissioner of public works, is largely responsible for the decision to eliminate macadam. Cost figures kept by him on the amounts expended on the maintenance of certain streets, showed that permanent pavements were actually cheaper in the course of a few years than the so-called inexpensive macadam, because of the rate that automobiles tear up the macadamized surface. Mayor Gainer is strongly in favor of the program advocated by commissioner Slade, and other officials have also lined up with him on it. The first contract under the new policy has been let by the Board of Contract and Supply.

Court Upholds Road Law.

Lansing, Mich.—Circuit judge S. G. Houghton, of Bay City, sustains the constitutionality of the Covert highway law, the validity of which was attacked in a friendly suit started in the Ionia circuit court. The decision of judge Houghton, which will undoubtedly be reviewed by the state supreme court, is not only a strong endorsement of the highway legislation enacted during the past few years, but is an official opinion that the highway bonds amounting to approximately $1,500,000 since the Covert law was placed on the statute books, will not be invalidated. Members of the attorney general's department who defended the law in the circuit court proceedings, are confident they will be able to win a permanent victory in an appeal to the supreme court. The circuit court was asked for a writ of mandamus to restrain the state highway commissioner from enforcing the provisions of the Covert law on the ground that its title is defective; that the provision of the constitution requiring uniformity of taxation has been violated, and that the rights of local self-government have been invaded.

In overruling the first objection Judge Houghton said: "It was held in an early case that the purpose of the con-

stitutional provision was to prevent the practice of 'log rolling' in the legislature. It has never been the purpose of the court to sustain this objection to an act if the purpose of the act was fairly indicated in the title, it being almost universally held that if the title fairly apprised the legislature and the public generally as to the object sought to be obtained, the title was sufficient. The machinery that is necessary to put into operation to reach the object sought by the title is fully covered by the title, and nothing is contemplated in the act that is not clearly covered by the title."

Answering the second objection the court says: "Where the property in the particular locality where the improvement is made is assessed according to benefits derived, neither the property nor the owner thereof has been discriminated against, nor injured, because they have paid for the assessment only what they have actually received.

"The provisions in the highway law for levying such assessments for benefits is in strict accord with the rule long established in this state in assessing property for benefits received. The property owner is given an opportunity to be heard, consequently has had his day in court and his property is not being taken from him without due process of law and proper hearing theron."

In regard to the charge that, through the operation of the law, the rights of local self-government are invaded. Judge Houghton says: "The powers that local municipalities have in and to the public highways is derived from the legislature, and the act in question does not authorize the state either to complete or maintain highways, but it provides that if a majority of the owners of the land assessed for the benefit by petition initiate the proceedings to construct and improve highways, in other words, after the local authorities, or those to be affected thereby, have initiated the movement for the improvement, then the machinery is provided whereby the necessary steps will be followed to a final consummation of what is desired by the locality affected thereby. While it does not appear on the record it is nevertheless a well known fact that considerable progress in the improvement of highways has been made under the highway laws of 1915. Bonds have been issued and sold and improvements made, and except in a strong case where injustice is sure to follow the proper administration of the operations of the highway law, they should be sustained."

SEWERAGE AND SANITATION

Health Surveys Near Army Camps.

Washington, D. C.—Extensive surveys have been made in regard to the health conditions in the districts immediately surrounding the training camps at Little Rock, Ark.; Memphis, Tenn.; Petersburg, Va.; Quantico, Va., and Louisville, Ky. At Columbia, S. C., operations are still in full swing and plans have been made for similar work around all other camps. The nature of the work to be accomplished varies at each camp, but generally includes such measures as water supply, drainage, extermination of flies and mosquitoes, and the general health of the neighborhood. In every case the work is done in cooperation with the state and local health boards, and outside of each camp will be placed a sanitary unit with medical specialists. The Public Health Service is in need of additional men and funds for the carrying on of this work and is depending for this help on the passage of a bill now pending in the House of Representatives.

American Commission for Health Work in France.

New York, N. Y.—The International Health Board of the Rockefeller Foundation has announced its preliminary arrangements for its fight against tuberculosis in France. The Commission for the Prevention of Tuberculosis in France has been selected and soon will begin its work in Europe. The commission will be headed by Dr. Livingston Farrand, president of the University of Colorado and the organizer and for ten years executive secretary of the National Association for the Study and Prevention of Tuberculosis. As associate directors Dr. Farrand will be accompanied by Dr. James Alexander Miller of New York, Homer Folks of New York, and professor Selskar M. Gunn of Boston. Herman G. Place of New York has been named as secretary to the director. Dr. Miller, who will take charge of those phases of the work relating to medical relief, is professor of clinical medicine in Columbia University, the director of the tuberculosis work of Bellevue Hospital, and president of the Association of Tuberculosis Clinics in New York City. He is recognized as one of the leaders of his profession in fighting tuberculosis. Mr. Folks is secretary of the New York State Charities Aid Association and has for many years been prominent in modern health legislation and its application. He is a member of the Public Health Council of New York State and a former president of the National Association for the Study and Prevention of Tuberculosis, as well as of the National Conference of Charities and Correction. In addition to the work for the Rockefeller Foundation, Mr. Folks will take charge of the tuberculosis relief work of the American Red Cross in France and thus assure the maximum of cooperation in attacking the problem. Professor Gunn is a member of the faculty of the Massachusetts Institute of Technology, is the secretary of the American Public Health Association, and editor of the American Journal of Public Health. He has had long experience in public health administration and in working out the new health laws of Massachusetts. His work in France will be specifically to take charge of the educational campaign which the commission will undertake.

U. S. Fights Malaria in Mississippi.

Jackson, Miss.—Inspection of Mississippi cities by experts of the United States Public Health Service, who have already completed reports on Jackson and Greenwood, will result locally in a determined effort to rid Jackson of malaria. Although the disease has never been unusually prevalent here, there have been a good many cases the year around, and Dr. Nolan Stewart, city health officer, has determined to banish it permanently. Both Greenwood and Jackson were given clean bills of health for the most part, Greenwood showing an extremely low morbidity and mortality rate from typhoid. Every city in the state of more than 5,000 population will be completely inspected by the experts and reported upon. The reports will form a basis for work of the state health department, cooperating with local authorities.

Patent Medicine Men Win Against City.

New York, N. Y.—New York city patent medicine manufacturers won an important victory over the department of health before the appellate division of the Supreme Court when the court declared invalid an ordinance effective Dec. 31, 1915, requiring the manufacturers of all proprietary remedies to register all the active ingredients of such remedies with the department of health. The ordinance provided that such register of ingredients was to be kept confidential. The validity of the ordinance was questioned before the appellate division in a proceeding brought by three firms against the city of New York and the department of health on an agreed statement of facts, which brought the case before the appellate division in the first instance. The five members of the court all concurred in an opinion written by justice Scott, in which he pointed out first that since the ordinance had not been ratified by the state legislature it was open to attack on the ground of unreasonableness.

WATER SUPPLY

Waterworks Capacity Doubled.

Fort Worth, Tex.—Recommendations of improvements urgently needed at the city's waterworks have been approved by the city commission. Water commissioner Lord stated in his recommendation that additional settling basins and aerating apparatus are needed. Detailed plans of these are now in the hands of the city engineer. The installation of this added equipment, he stated, will lower the cost of the water treatment and at the same time improve the quality of the water. Another recommendation was to increase the filtering capacity of the water works. This would assure the city an abundance of pure water throughout the year, he said. The water consumption now is about equal to the filtering capacity and with continued dry weather it will exceed the filtering capacity, he pointed out. By the recommendation the water supply of the city will be exactly doubled. Work on the filtration plant, sedimentation plant and aeration system is authorized by this action. The sedimentation basin will be doubled in ca-

pacity from 5,000,000 to 10,000,000 gallons and the filtration plant will have a like capacity. Bids will be called for soon on the enlargement of the plant.

Novel Method of Stealing Water.

Larkspur, Cal.—After the town trustees had investigated the Larkspur Water Company's alleged water steal from the Marin Municipal Water district, at a meeting, O. F. Meldon, town attorney, submitted an argument declaring the company "a nuisance which ought to be abated." There is now some talk of having the town own its own water system. Mayor Fred Ammann questioned the two lessees of the company, A. W. Larsen and Louis de Cormec, and they denied any knowledge of how their water pipes came to be inclosed in dummy sewer pipes. The discovery that someone had cut the main of the water district and was drawing about 50,000 gallons a day from it into water pipes within dummy sewer pipes, was made about a month ago by John Burt, superintendent, who said the withdrawing of water might have been going on for the last ten years. Larsen and de Cormec leased the system from the American Land and Trust Company. Water in the reservoirs of the company was condemned as unfit for use a week ago by Dr. J. H. Kuser, county health officer.

Water Shortage Revealed by Fires.

Texarkana, Ark.—The failure to obtain sufficient water pressure and supply during three fires on one day resulted in a called meeting of the two city councils which met in joint session at the Arkansas city hall. It had been rumored that there was a water famine and the developments at the meeting more than confirmed this. Superintendent Wood of the Texarkana Water Corporation told the two councils that the city had outgrown the capacity of his company. He said everything possible had been and still is being done to meet the requirements. All sources of supply in the local field have been utilized to the limit, but to no avail—the water is not here in sufficient quantity to meet present requirements. As a means of tiding over the situation the council ordered that the water company discontinue its daily supply of 400,000 gallons to the railroads, giving them instead only 25,000 gallons a day for their engines. It also was ordered that the pumping station shall supply water to the reservoir from 9 p. m. to 5 a. m., in order to provide water for fire protection. A resolution was adopted urgently requesting the public to refrain from sprinkling lawns and using water in other ways that can be dispensed with. City attorney L. Jean Cook, who was present, was instructed to make a full investigation of conditions and to take whatever course he might deem necessary to compel the water corporation to comply with the terms of its contract with the city

STREET LIGHTING AND POWER

Gas Rate Increased.

New Bedford, Mass.—Oliver Prescott, president of the New Bedford Gas & Edison Light company, has written two letters to mayor Ashley in explanation of the recent decision of the directors of the company to increase the price of gas to consumers from 80 cents net to 95 cents net, on bills rendered on and after August 1st. Mr. Prescott states that "the price of gas was fixed at 80 cents net in the month of August, 1910. At that time the cost of gas coal per thousand feet of gas made was 32.6 cents, today it is 56.7 cents, an increase of 74 per cent. In August, 1910, oil used in the production of water gas cost per thousand feet 9.88 cents, and today it costs 18.92 cents, an increase of 91½ per cent. Labor in August, 1910, per thousand feet of gas made came to 6.7 cents and today it is 8.5 cents, an increase of 27 per cent. The interest on borrowed money today costs us something like 50 per cent. more than it did in 1910. The total cost of gas has increased about 56 per cent. In 1910 we were paying 3 cents a gallon for oil, and today we are paying 6.375 cents per gallon; gas coal cost $3.60 per ton, and today it costs $6 per ton. It is perfectly true that our residuals have increased considerably in value. In August, 1910, our coke was worth $4.17 a ton, it is now worth $5.75. In August, 1910, tar was worth $1.50 a barrel and it is now worth $2.50. Ammonia in 1910 as worth 5 cents a gallon and is now worth 8½ cents. We are getting 2 cents a gallon for water gas tar, for which in 1910 we got nothing. It is the increased value of the residuals which helps us to keep the price down even as low as it will be in the new schedule. In May, 1917, the gross cost of coal gas in the holder was 91.6 cents per thousand feet, whereas in August, 1910, the gross cost was 53.6 cents, this is an increase of 38 cents per thousand feet. The net cost of coal gas in the holder in May, 1917, was 53.8 cents, while in August, 1910, it was 27.3 cents, an increase of 26.5 cents per thousand feet. While the residuals help materially to reduce the cost of coal gas, they are not sufficient to keep it down."

Utilities Equipment Removable When Franchise Expires.

Wilson, Kans.—The supreme court at Topeka has handed down a decision under which Kansas cities may direct the removal of all property of public utilities from streets and alleys following the expiration of franchises. The decision was made in directing the removal of poles and wires of the Wilson Electric Light Company from the streets and alleys of this town. The court states that a public utility operating under a franchise has no right to use the streets and alleys except with the consent of city officials. Scores of Kansas utilities may be affected by the decision following the expiration of franchises.

City Light Plant Sold.

Monroe, Mich.—Vice-president A. C. Marshall, of the Detroit Edison Company, has been here and closed the deal between the city of Monroe and the company, which was recently granted a 30-year franchise for lighting the city. Mayor Adam Graessley and clerk Fred M. Kressbach on behalf of the city executed a bill of sale to the Edison company for all the property of the old municipal lighting plant, except a motor truck. They also executed a warranty deed for the lot upon which the municipal lighting plant now stands. They also signed the 10-year contract for the furnishing of electric light for public use in the city. Vice-president Marshall on behalf of the company presented two checks; one of $82,337 for the old inventory and another for $9,882.14 for supplies on hand and for extensions made since the inventory was taken. There will be no change at present in the personnel of the force now taking care of the plant.

Company Wins in Kansas Natural Gas Case.

Kansas City, Kans.—A final decree in the federal court litigation concerning the Kansas Natural Gas Company, has been filed here by judge Wilbur Booth. The decree makes permanent an injunction restraining the Kansas public utilities commission from enforcing a 24-cent rate in that state. It also takes control of the company from the commission, decreeing that the company is engaged in interstate commerce. The 28-cent rate fixed by the commission was characterized as being "unreasonably low." The decree also sets forth that certain Kansas laws giving control of the company to the commission are misdirected and therefore unconstitutional. Judge Booth reserved to his court jurisdiction over contracts existing between the company and its distributers. Likewise the decree claimed rate-making power for the federal court, adding that all rate controversies must come into it. The decision was characterized by H. O. Castor, attorney for the Kansas utilities commission, as permitting the company to fix any rates it desired, subject to review by the federal court. Judge Booth announced that the federal receivership of the gas company would be dismissed as soon as possible.

Use of Gas and Electricity Restricted.

Stockholm, Sweden—A recently issued royal decree prohibits the use in Sweden of electricity and gas for signs or for advertisements out of doors. The same decree also limits the use of gas and electricity in private houses and commercial buildings. In Stockholm there may be used only 60 per cent of the quantity used during the like period last year. This amount is furnished at the usual rate—3.2 cents per cubic meter (35.3 cubic feet) for gas and 9.4 cents per kilowatt for electricity. An additional 30 per cent. may be used, if necessary, at greatly increased rates,

i. e., 13.4 cents per cubic meter for gas and 18.8 cents per kilowatt for electricity. If the amount used exceeds 90 per cent of the amount used during the past year the current will be cut off entirely.

FIRE AND POLICE

All Firemen Out on Strike.

Vancouver, B. C.—Vancouver was left without a fire department, every member of the force having gone on strike and having left the fire halls in every part of the city. Demands were made upon the city for changes in conditions of work and increased pay. An ultimatum was issued to take effect the next afternoon. The ultimatum was not met and the men made good their threat and quit their posts. Until a special meeting of council could be called, the city was in the hands of unorganized fire fighters. At a recent plebiscite the two platoon system was voted down.

Police Commissioner Couzens' Anti-Vice Campaign.

Detroit, Mich.—Members of the common council have finally voted to support the campaign of police commissioner James Couzens to rid the city of commercialized vice. The commissioner asked for an ordinance giving the mayor power to close up rooming houses and hotels which have taken the place, according to the police, of the former segregated district. Twelve members voted against the measure. Twenty-two supported it. Alderman Littlefield, in opposing the measure said: "Let the police commissioner start out and get these burglars, holdup men and pickpockets if he wants something to do. Here he is instead, asking us for a chance to get after some poor woman who may be a little off on virtue, or perhaps immoral. This ordinance would mean a fine and imprisonment for any man who signed false names on a hotel register. Think of what that would mean to a family man —disgracing his family. Or even a young, single fellow, what's going to happen to him if he is caught in one of these hotels? It's a vicious ordinance." Alderman Kronk urged the immediate passage of the measure. "You will tie the commissioner's hands if you do not give him this ordinance," he said. "He has cleaned out the 'red light' district, and he needs this power to go ahead with the work. If he doesn't have it, the city will be worse than it ever was." The ordinance, which will go into effect August 1, provides that hotels and rooming houses with more than six rooms for rental by the day must be licensed under a fee of $1 a year. The mayor can revoke the license if the place is improperly conducted.

Thrilling Events at Realistic Fire Show.

New York, N. Y.—Excitingly realistic demonstrations of work by the fire department marked the recent ceremonies which accompanied the presentation by Mayor Mitchell, of medals to firemen for meritorious service, performed during 1916. The celebration was held in the large stadium of the City College. At one time there was a near-panic caused by a demonstration of the work of firemen fighting a real blaze. A three-story skeleton structure of beams and laths had been prepared for this demonstration in the midfield. The structure was set fire by means of chemicals and was soon a mass of flames from basement to attic. A brisk breeze drove smoke, sparks and heat waves directly into the north end of the stand, and there was an immediate rush to get away from the blistering heat. The firemen in the stand managed to persuade the people to remain in their places until the fire apparatus arrived from outside and extinguished the blaze. While water tower No. 3 was pouring water into the blazing building a sudden shift of wind sent a shower of water over the spectators, causing another flurry. Following the award of medals there was a parade of medal men of the department led by the fire department band. Then came a calisthenic drill by 135 probationary firemen, which ended with the rescue of a woman and two children from the third floor of the building about to be burned, by means of a new device invented by battalion chief Thomas F. Dougherty. One of the most interesting events of the program was a parade of fire-fighting apparatus of various periods from 1725 up to the present day. In this parade the greatest applause was given to three squads of old-time firemen in red shirts drawing engines of the type of 1810, 1820 and 1860. Following this came a demonstration of the superiority of the motor-drawn vehicle over the old horse-drawn apparatus. Mayor Mitchell turned in a regular alarm, to which the horse-drawn engine and the motor engine responded. The race of the motor against the horse covered exactly one mile and finished at the stadium. Two of the fastest horses in the department, in charge of one of its most skillful drivers, were groomed for the contest. The motor, starting from the same house at the same time, arrived on the scene fully three minutes ahead of the horse-drawn apparatus.

GOVERNMENT AND FINANCE

Manager Plan Unconstitutionality Reaffirmed.

Watertown, N. Y.—The appellate division, fourth department, at Rochester has filed a decision in the Watertown commission form of government case upholding the decision of justice E. C. Emerson that the entire act is unconstitutional. There were two dissenting opinions by justices Kruse and DeAngelis, while four justices affirmed the decision. The case will now be taken before the Court of Appeals, which will probably render a final ruling in September. Local officials are asking for a special term to decide before election. If this is not granted, it means that procedure in municipal election matters in the fall primaries will be in the usual form, with the nomination of aldermen and mayor. The commission form is eliminated for the present, and will remain so until the Court of Appeals rules otherwise. If it affirms this ruling by the Appellate division, the matter will be settled, but should there be a reversal, a special election in this city would be necessary next fall. The commission form of government, plan C, with city manager and five commissioners to take the place of the present common council with boards method, was voted by the people two years ago, to be placed in operation January 1, 1918. A ruling by the attorney general in the Niagara Falls case that the act creating this form of government was unconstitutional led to a further investigation by local officials. It was decided to start a test case, and Steven R. Cleveland as a citizen and a commissioner of the Board of Waterworks, which would be eliminated by the change, brought the test action with the aldermen and city officials as defendants. Justice E. C. Emerson heard the arguments and ruled that the entire act on the commission form of government is unconstitutional. The appeal was then taken to the appellate division.

Protest Antagonistic Commission's Ousting of Manager.

Portsmouth, Va.—The city has been stirred up to indignant protest by the action of a majority of the city council in suddenly ousting city manager Tyrrell B. Shertzer. The resolution on which the council acted was, "Whereas, it appears to the council of the city of Portsmouth that T. B. Shertzer is not familiar with the needs and urgencies of the city of Portsmouth, and is unable to satisfactorily handle the municipal affairs of the city, therefore, be it resolved by the council that the services of T. B. Shertzer, as city manager, be dispensed with on and after July 31, 1917." While the dismissal was given without warning it was well known that a majority of the council has all the time been opposed to the manager form, and these members were usurping the manager's powers and doing their best to break the administration. Manager Shertzer took charge the first of this year. The council which appointed him had been in office since Sept. 1, 1916. It had divided itself into six departments, with one councilman at the head of each. The council made up the budget for the year making out all the appropriations in minute detail so that the city manager had no opportunity to make a redistribution or to use his discretion in the expenditure of the funds. The finances were close to the statutory debt limit. In spit of an opinion by the city attorney that the departmental administration was not the type of government voted upon by the people, and in spite of a clear

understanding at the beginning that the arrangement was only to be temporary, the council persisted in handling the executive details rightly under the control of the manager. Mr. Shertzer consulted the chairman of the proper department before acting, although this was against the spirit or letter of the city manager act. The income of the city for the year was $421,297, but after deducting interest and other fixed charges, only $206,953 was left for the conduct of all the municipal activities, so that great savings were hardly possible. On assuming office the manager proved affairs chaotic in many respect. The finances were involved; the streets not adequately cared for; garbage was not systematically collected, because of a disorganized street cleaning force; the fire and police departments were also disorganized, and inefficient methods prevailed generally throughout city offices. Since the first of the year manager Shertzer has reorganized the police department. He has purchased motor fire apparatus under arrangements whereby the cost of it will be met in 7½ years by the difference in cost of maintenance between the motor and the horse drawn equipment. He standardized the system of purchasing supplies and issuing them on proper requisitions, which has resulted in a saving of from twenty to twenty-five per cent. "Running accounts" have been eliminated by a standardized system of auditing and paying bills. A vigorous campaign was instituted for collecting taxes and license fees, which has proved successful. Street cleaning and garbage collection methods were improved so that with equipment costing one-third more, fifty per cent more work was accomplished at a unit cost two-thirds of that before. The constitution of the council has changed completely since its election, and to this is attributed its attitude. One member died, one resigned on account of ill health and one partly for business reasons, and partly from disgust. Advantage was taken of the absence of one of the members to choose a man favorable to the opposition to fill the first vacancy and then two more, so that now there are five councilmen against the city manager and two for him. Manager Shertzer believes the dismissal is an attempt to discredit the manager plan rather than himself. The two favorable councilmen, Oscie Dashiell and John A. Morris, have issued long statements defending the manager's actions. Council met to consider the citizens' protests but reaffirmed its resolution to oust the manager.

Bethlehems Consolidate.

Bethlehem, Pa.—Following a rousing campaign, with parades, bands and speeches, the citizens of Bethlehem and South Bethlehem voted to consolidate the two municipalities by an overwhelming majority. In the former the vote was 3,463 for to 77 against and in the latter, 2,527 to 92. Better tax methods, improved fire department and opportunity to do more street work were some of the reasons given for consolidation. The project was backed by Charles M. Schwab, of the Bethlehem Steel Company.

Morgan Syndicate Gets Big New York Bond Issue.

New York, N. Y.—A syndicate consisting of J. P. Morgan & Co., the First National Bank, the National City Company, the Guaranty Trust Company, the Bankers Trust Company, Brown Brothers & Co., and Harris, Forbes & Co., took the entire offering of $55,000,000 worth of city bonds at the sale in the controller's office. The price was 100.6507, which controller Prendergast said was satisfactory in view of war conditions and the unusual demands being made upon the financial and material resources of the country. The sale consisted of two lots, one being $47,500,000 of 4½ per cent corporate stock and the other $7,500,000 4½ per cent corporate stock, fifteen-year serial. The former are fifty-year bonds and the latter will mature in from one to fifteen years. The syndicate put in two bids, one for the entire $55,000,000 at 100.6507 on an "all or none" basis and another for any part of both lots at 100.0207. Another banking group headed by William A. Read & Co., put in a bid offering to take all or any part of the $47,500,000 lot at 100.277. There were 131 bidders altogether. The income basis for the fifty-year bonds will be 4.46 and the serial bonds, 4.39. The total amount of the bids received was $193,865,830. The controller issued this statement: "The syndicate's total bid price was $55,357,885. The highest bids for $55,000,000 of bonds outside of the syndicate's bid would have brought $55,304,133.70. Thus the syndicate's bid was better for the city by $53,751.30. The average of the highest non-syndicate bids was 100.5529, as against 100.6507 for the syndicate. In May, 1913, when the great European countries were at peace, the best price we were able to secure at a sale of $45,000,000 of 4½ per cent bonds was 100.137. Although the figure realized today is below that of the sale of 4½ per cent bonds in June, 1915, the difference is slight."

TRAFFIC AND TRANSPORTATION

Traffic Ordinance Sections Held Void.

Indianapolis, Ind.—Sections of the Indianapolis traffic ordinance which provide that vehicles shall not pass street cars when passengers are leaving the cars, and that vehicles shall not pass a street intersection at a speed greater than one-half the speed permitted by law, were recently held invalid and void by Louis B. Ewbank, judge of the circuit court. The judge held the city ordinances in conflict with state laws, and for that reason void. The ruling was made on motion of attorneys for a baking company to strike out of a complaint allegations that a truck driver had violated the traffic ordinances, in that he had passed a street car, and that the truck, by reason of the negligence of the driver, had struck and injured the complainant. The suit was partly based on the allegation that the company was liable for damages because its employe had violated the city ordinances. In the ruling the court cited the state laws covering the same offense, including the specific provision that a city has no legal right to make laws regulating the speed of motor vehicles if the regulations provided by city ordinance are inconsistent with the state laws. The judge held that the state laws fixed the regulations concerning speed of motor cars, and that the city ordinance was in conflict therewith. The state law provides in effect that drivers of motor vehicles when approaching standing street cars and street crossings shall slow down, and if it be necessary for the safety of the public the driver shall bring his vehicle to a full stop; that in approaching a pedestrian the driver shall slow down and take necessary precautions to guard against accident. The legal rate of speed in closely built up sections of cities is fixed at ten miles an hour. Cities have authority to make motor truck regulations, but this is not done, the judge said. "It will be noted," said the judge in the ruling, "that this ordinance does not undertake to make special regulations as to motor trucks and motor driven commercial vehicles, but applies alike to any vehicle. It makes a regulation as to motor vehicles passing street cars that is different from and inconsistent with the provisions of the statute. Such provisions are clearly void."

Try Six-Cent Fare in Massachusetts.

Boston, Mass.—President Sullivan of the Bay State Street Railway company has been successful in his effort to have the six-cent controversy reopened. The commission has approved it for a six months' period. The loss to the savings banks of the state which are said to have $200,000,000 invested in the company's securities, was considered by president Sullivan the principal argument used to secure a reopening of the case. The proposed changes include the substitution of a six for a five cent fare, an additional charge of one cent for a transfer and general increases in the rates for workingmen's tickets. Attorneys for the company presented figures to show that the company ought to earn $1,404,906 more than the estimated receipts for this year. The proposed increases, it was estimated, will yield an additional revenue of $720,000 instead of the $1,111,700 asked. The company tried to obtain a strategical advantage by changing proposed fares in the new schedule so that opposition would be divided. The cities in the territory affected protested vigorously and after conferences the schedule proposed by the company was modified. The schedule agreed upon provides for a rate of twenty tickets for $1, to be good except on Satur-

days after 1 p. m., Sundays and holidays, within the seventeen cities served, between such of these cities as are adjoining, and between such cities and adjoining towns or portions of towns as by reason of location or density of population are practically part of such cities. The charge of 1 cent per transfer, proposed by the company, was eliminated, but it was provided that transfer privileges would be adjusted outside this territory by restricting the length of ride to that reasonably furnished for a single fare. The proposed increase in the price of workmen's tickets to 80 per cent of the cash fare where they cover two zones and to 66⅔ per cent where they cover three, or from $2.20 to $2.40 and from $1.40 to $1.92, was also eliminated. Any patrons within the present five-cent territory who will be excluded from the twenty-ride dollar rate will have the right of appeal "without prejudice" and similar rights on the transfer question. The company is to keep a detailed account of the six months' trial and then the whole case is to be reopened. The protesting cities asked for the sale of ten tickets for 50 cents or five for 25 cents. The commission holds it not unreasonable to require an investment of $1 because the large majority of present schedules for workmen's and other special tickets provide for an investment of $1 or more; because an investment of as much or more is commonly required for similar tickets issued by other Massachusetts companies, steam and electric; and because the issue of such tickets in smaller amounts would lead to their use by casual riders and thus result in an unwarranted decrease in revenue. In regard to the plea of certain communities for exemption, the commission says: "Without much question other communities might have urged considerations equally pertinent to show that they also should be exempted. Such objections, we feel, are based upon a failure to appreciate the spirit and significance of the agreement. Under this the company will not secure all that it claims it ought to have, and this is equally true of certain communities." President P. F. Sullivan, following the agreement, said: "When we ask the public to turn in and help us make a success of this six months' experiment, we have their interests in mind as well as our own. City officials can aid us materially by regulating jitney competition. We do not ask that jitneys be abolished. All we ask for is a square deal. Unregulated jitneys divert from our treasury more than $300,000 a year. We are going into this experimental period with the feeling that we have back of us the public, and we shall take special pains to acquaint the public with what we are doing."

Cities Oppose Six-Cent Fares.

Albany, N. Y.—Following the request of 28 electric railways throughout the state for a six-cent fare, the public service commission of the second district has been holding hearings at which the cities affected have been making vigorous and organized opposition. The population of the cities involved is estimated at 1,500,000. The cities, acting through the mayors' conference, of which mayor Cornelius F. Burns of Troy, is president, asked the commission that it refuse to entertain any application for an increase unless and until the railways furnish a complete inventory and appraisal of all their physical property used for railroad purposes together with a statement of revenues and expenses as will furnish a fair average over a period of years. Practically every city in the state affected is represented, together with members of the various chambers of commerce and boards of trade. The first hearing dealt with methods of procedure. The question was then brought up as to whether the commission has the power to increase the fares against the provisions of old maximum rate statutes and local franchises. Chairman Van Santvoord of the commission made plain that court rulings in the Ulster and Delaware case and other instances had clearly indicated that it was the commission's duty to readjust rates if relief was necessary. He made the point that the most important thing was to establish just what should constitute grounds for relief. The briefs filed by the various municipalities set forth the special franchise agreements in force in each individual case. In some instances franchises were granted and accepted on the understanding that not more than five cents could be charged for a single fare. In the case of Rochester a special act of the legislature, passed after the law under which the Public Service Commission acts, stipulated that the fare in that city could not be more than five cents. Representatives of the city of Rochester pointed out that the increase to six cents asked by the street railway companies would cost the people of Rochester $750,000 annually. Mayor George R. Lunn and corporation counsel Frank Cooper filed a protest for Schenectady, which said that the commission has no power under the railroad law and the public service commission law and because of the franchises. The protest continues:

> The petition does not show that said company is not earning a reasonable average return upon the value of the property used in the public service, but that on the contrary the operations of the road as shown by its statements indicate that the company is earning a reasonable average return upon the investment; that the facts that facilities for traffic have improved, that labor and material costs are temporarily and for the moment higher, that certain other expenses are higher, is of no moment, if, as appears, the operating revenues are also correspondingly increased or nearly so; that while materials are temporarily at a great inflated value the said company is not constructing or about to construct any improved extensions and is not using a great quantity of materials and that in any event the present prices of such materials is an inflated price and through governmental action and otherwise the price of materials will in all probability be reduced at an early date and such reductions will probably be progressive.
>
> That in spite of the taxes for the year 1917 being higher than the taxes for the preceding year the state tax commission has reduced the equalized franchise values of the petitioning company in the city of Schenectady from $2,656,368 in 1916 to $2,450,800 in 1917; that it does not appear that the said company will be called upon to pay any war taxes under any legislation now in existence or under process of consideration by any legislative body of the state or nation.
>
> That it will be further evident from an examination of the records of the petitioning company that a portion of its property used in the public service was paid for out of earnings and that said company is not entitled to earn for its stockholders or bondholders a return upon such portion of its properties as were constructed and paid for out of earnings taken from the public.

Investigating Niagara Falls Car Wreck.

Niagara Falls, N. Y.—A coroner's inquest is bringing out details regarding the recent fatal street car wreck near Whirlpool Rapids in the lower Niagara Gorge in which eleven were killed and from three to fifteen estimated to be missing. Officials of the Niagara Gorge railroad put much of the blame for the wreck upon National Guardsmen who saw the foundations of the track slide into the river and did not flag the approaching car. The officials said that the retaining wall supporting the tracks at the brink of the lower gorge at the point which gave way was a dry wall of stones piled up with no cement binder; that the power was not shut off when the company received warning because of the fear that if this were done it might endanger other cars on the steep grades; that there is no telephone signal dispatching system along the lower gorge between Lewiston and Niagara Falls, because the roar of the rapids is too great to permit anyone to hear over a telephone, and that an inspector rushed to the scene of the wash-out on a special car, but reached the point a few minutes after the car had toppled into the river. A track inspector testified that the line between Lewiston and Niagara Falls is inspected every morning before traffic is started over the route. Loose boulders on the cliffs above are blasted out and a careful watch is always kept on the entire route. The motorman of the wrecked car said he received the first warning of the undermined roadbed when the track began to sag under the car. Before he realized what was happening, the car toppled over the embankment into the river. The company denied the statement of four witnesses, who claimed that they had warned the company twenty minutes before the wreck that the track had been washed out.

MISCELLANEOUS

Mayors Plan Municipal Markets.

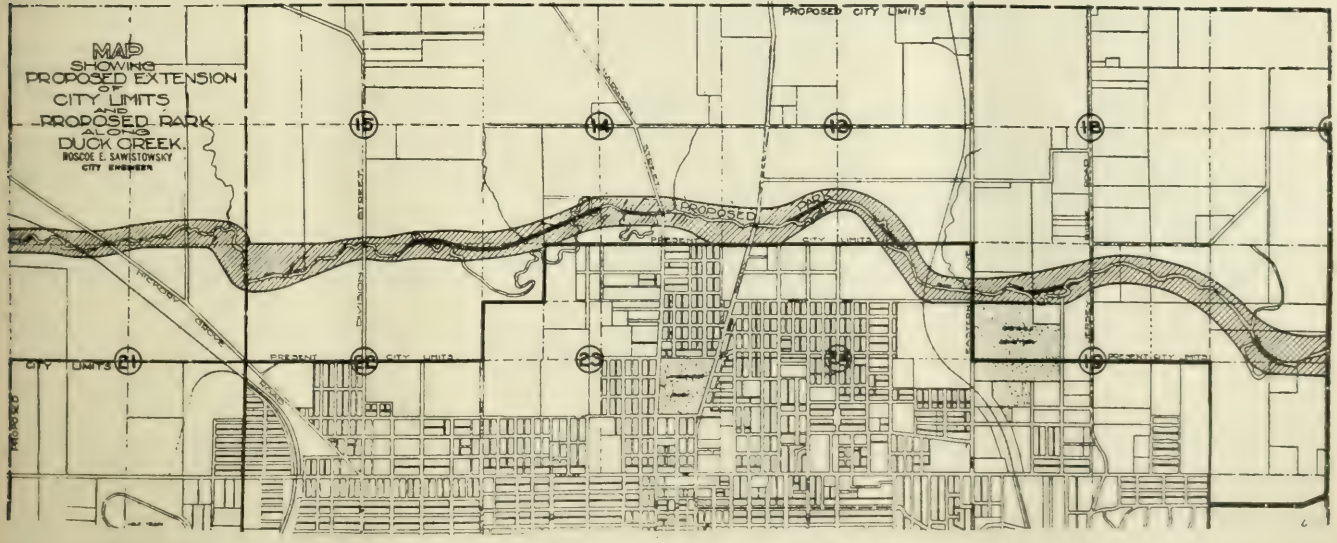
Albany, N. Y.—Machinery for an effective disposition and conservation of food for urban consumption will be established by every city in New York State by September 1, if the plans of the State Conference of Mayors, announced by secretary William P. Capes, are carried out. The first

step is to put into effect in every municipality Article 4 of the new Farm and Market Law by establishing departments of markets. This article provides that market departments established by cities may operate municipal public markets, make necessary rules, inspect food, license auctioneers, dispose of consignments of food and operate bureaus of food information. It was drafted by a special committee of the Mayors' Conference of which mayor George R. Lunn, of Schenectady, was chairman. In a letter to the mayors of the state, mayor Cornelius F. Burns, of Troy, president of the Conference, said: "Within the next two months every city in the state should establish a department of markets, which under the new law will have authority to establish machinery necessary for the proper distribution of food for urban residents. This is the most effective way the cities can at the present time assist the state and the nation. It is just as important for the small as for the large cities to establish a department of markets. By creating such a department it is not necessary immediately to establish or even to contemplate establishing public markets. Your department will eventually determine the necessity for these, and those cities which now have public markets can operate them under the new department. A market department in both small and large cities can study and provide for the needs of its population, the distribution of food and plans for any additional necessary facilities. It can also conduct local campaigns for the conservation of the supply, assist the producers to dispose of their produce and help the retailer and consumer to obtain adequate supplies at reasonable prices. It will soon be time to distribute, store and conserve the crops. We, therefore, have very little time to organize or to reorganize our city departments for this purpose." The Conference hopes by September 1 to report to president Wilson and governor Whitman that the Empire State cities are ready and equipped effectively to cooperate with the food departments under their jurisdiction. "With a department of markets organized in every city," said Mr. Capes, "the food speculators will have hard sledding in New York state, the farmers and other producers will find it easier to dispose of their produce in good markets and the urban consumer will benefit by a larger supply and a more equitable distribution of the crops."

The new law provides that the local authorities of a city in which a department of public markets shall be created may designate for such use as public markets any lands owned by the city and not dedicated or devoted to another inconsistent use; or any space over the waters of a navigable stream adjoining any dock or any wharf of such city, provided such market shall not interfere with the flow of such water of such stream or extend beyond the pier or bulkhead line established by law. "The commissioner of public markets of a city may make, amend or repeal rules for the government, regulation, control, discipline and conduct of: (1) The business of the department; (2) the repair, care and use of market and concerning fees, the hours during which business shall be conducted and the general management of the markets; (3) all vehicles, including pushcarts, from which market produce shall be sold; (4) all auctions conducted in such markets and all auctioneers doing business therein; (5) the establishment of standards or grades for different classes of market produce not inconsistent with law or with the rules of the State Department of Agriculture, Foods and Markets; (6) the receipt, handling, storage and sale at public auction of market produce consigned to auctioneers in the market. The consignor or consignee of any food consigned to a tenant, occupant or licensee of space in any public market shall be entitled to have the same examined by a market inspector when it shall have been received at such market. The inspector shall immediately report a detailed description in writing of the consignment and its condition at the time of its examination. Any person who shall sell or offer for sale at public auction any food in the markets established under law without having first obtained from the department of public markets of the city a license shall be guilty of a misdemeanor, punishable by imprisonment for not more than six months or by a fine of not more than $500 or by both."

Proposed Park Development Along Creek.

Davenport, Ia.—The proposed extension of the city limits will add 7¾ square miles, or 4,960 acres to the present city, almost doubling in size the present area of 8¾ square miles, or 5,625 acres. The city council has decided to bring the matter before the people at the next election. Davenport has at present only 107.45 acres of parks or approximately one acre of park for every 500 inhabitants. The proposed park along the Duck creek valley would provide about 400 acres additional for park purposes. The city council is taking steps to bring about the annexation of this territory in order to obtain control of the platting and laying out of new additions. If the platting of this territory is not regulated a jumbled up mess of streets would result, as it has happened in many parts of Davenport. To have a plan for the basis of the city's growth the city council has ordered city engineer Roscoe E. Sawistowsky to prepare a city plan for the future extension of streets and alleys in this territory. The city council can then prevent the laying out of any additions in this territory which do not provide for the extension of streets and alleys through its limits as shown on the plan prepared by the city engineer. At present there is in the city of Davenport streets and alleys, laid out years ago, which will cost the city approximately $120,000 to grade.



PROPOSED PARK ALONG CREEK BANKS, DAVENPORT, IA.

NEWS OF THE SOCIETIES

Calendar of Meetings.

July 24-27.—DOMINION ASSOCIATION OF FIRE CHIEFS. Annual convention, Port Arthur and Fort William, Ont. Secretary, James Armstrong, Chief, Fire Department, Kingston, Ont.

July 30-Aug. 3.—SOUTHERN SOCIOLOGICAL CONGRESS. Annual meeting, Blue Ridge, N. C. Secretary, J. E. McCulloch, 508 McLachlen Bldg., Washington, D. C.

Aug. 1-3.—AMERICAN SOCIETY OF SANITARY ENGINEERING. Annual meeting, Grand Rapids, Mich. President, William C. Groeninger, Ohio State Board of Health, Columbus, O.

Aug. 6.—PACIFIC COAST ASSOCIATION OF FIRE CHIEFS. Twenty-fifth convention, Anaconda, Mont. Secretary, ex-Chief H. W. Bringhurst, Seattle, Wash.

Aug. 15-17.—LEAGUE OF WISCONSIN MUNICIPALITIES. Annual convention, Racine, Wis. Secretary, Ford H. MacGregor, Madison, Wis.

Aug. 21-23.—NEW YORK STATE FIREMEN'S CONVENTION, Flushing, N. Y. Secretary, Thos. Honohan, Frankfort, N. Y.

Aug. 22.—UNION OF NEW BRUNSWICK MUNICIPALITIES. Annual convention, St. John, N. B. Secretary, James King Kelley, St. John.

Aug. 27-29.—UNION OF CANADIAN MUNICIPALITIES. Annual convention, London, Ont. Secretary, W. D. Lighthall, K.C., Westmount, Que.

Aug. 29-31.—UNION OF NOVA SCOTIA MUNICIPALITIES. Annual convention, Truro, N. S. Secretary, Arthur Roberts, Bridgewater, N. S.

Aug. 29-31.—ONTARIO MUNICIPAL ASSOCIATION. Annual convention, Toronto, Ont. Secretary, B. H. Spence, 705 Lumsden building, Toronto, Ont.

Sept. 5-8.—LEAGUE OF AMERICAN MUNICIPALITIES. Annual convention, Gary, Ind. Secretary, Robert E. Lee, City Hall, Baltimore, Md.

Sept. 11-13.—AMERICAN ASSOCIATION OF PARK SUPERINTENDENTS. Annual convention, St. Louis, Mo. Secretary, Roland W. Cotterill, 533 City Hall, Seattle, Wash.

Sept. 11-14.—NEW ENGLAND WATERWORKS ASSOCIATION. Annual convention, Hartford, Conn. Secretary, Willard Kent, 715 Tremont Temple, Boston, Mass.

Sept. 18-20.—LEAGUE OF VIRGINIA MUNICIPALITIES. Annual convention, Lynchburg, Va. Secretary, L. C. Brinson, Portsmouth, Va.

Sept. 24-29.—LEAGUE OF CALIFORNIA MUNICIPALITIES. Annual convention, Santa Rosa, Cal. Secretary, Wm. J. Locke, Pacific Building, San Francisco, Cal.

Sept. 25-27.—SMOKE PREVENTION ASSOCIATION. Annual convention, Columbus, O. Secretary, Frank A. Chambers, City Hall, Chicago, Ill.

Sept. 27-29.—AMERICAN AND CANADIAN ENGINEERS AND ARCHITECTS OF NORWEGIAN BIRTH OR DESCENT. Informal congress and re-union, Chicago Norske Klub, Chicago, Ill. Chairman, Committee on Arrangements, Joachim G. Glaver, consulting engineer, Chicago, Ill.

Oct. 15-17.—NATIONAL HOUSING ASSOCIATION. Annual conference. Hotel La Salle, Chicago, Ill. Secretary, Lawrence Veiller, 105 East 22d St., New York City.

Oct. 17-18.—LEAGUE OF MINNESOTA MUNICIPALITIES. Fifth annual convention, St. Cloud, Minn. Secretary-treasurer, Richard R. Price, University of Minnesota, Minneapolis.

Nov. 19-24.—CITY MANAGERS' ASSOCIATION. Annual meeting, Detroit, Mich. Secretary, W. L. Miller, City Manager, St. Augustine, Fla.

Nov. 21-24.—NATIONAL MUNICIPAL LEAGUE. Twenty-third annual meeting, Hotel Statler, Detroit, Mich. Secretary, Clinton Rogers Woodruff, 703 North American Bldg., Philadelphia, Pa.

Nov. 20-23.—PLAYGROUND AND RECREATION ASSOCIATION OF AMERICA. Recreation Congress, Milwaukee, Wis. Secretary, H. S. Braucher, 1 Madison Ave., New York, N. Y.

National Electric Light Association.

In line with the action taken by the national body, the New England Section of the N. E. L. A. decided at its last executive meeting to abandon the annual meeting scheduled to take place at New London, Conn., Sept. 11 to 14. Plans have been laid for a meeting at Boston to discuss the problems created by the war, but the date has not yet been determined. Similar action has also been decided upon for the Iowa, Michigan and Pennsylvania sections.

Union of Canadian Municipalities.

Following is the preliminary outline of the annual convention of the Union of Canadian Municipalities, which will be held at London, Ont., August 27 to 29. "Win the War" and "After the War" will take up a large part of the program.

Monday, August 27th, 11:00 a. m.

Business Session.

Official Welcome.

President's Address.

Report of Hon. Secretary.

Report of Assistant Secretary—Finances.

Report of Parliamentary Agent.

Reports of the several Provincial Municipal Unions.

Monday, 2:30 p. m.

Win the War—Municipal Councils' Session.

Formal Opening of Convention.

Short Addresses:

How Municipal Councils can help to Win the War.—Discussion and Resolution.

Short Address:

Should the Federal Government seek the Co-operation of the Municipal Councils to help put into practice all War Measures directly affecting the people?—Discussion and Resolution.

Short Addresses:

High cost of living, and the remedy.

(a)—Trusts and Combines—an influence.

(b)—Municipal Trading—as a remedy.

(c)—Food Controller—as a remedy.

(d)—Cost of Living Tribunal.

(e)—Fuel Questions.

Monday, 8:00 p. m.

Banquet—Tendered to the Delegates by the mayor, city council and citizens of London.

Tuesday, 10:00 a. m.

Win the War—Preparation Session.

The responsibility of municipal councils to prepare for the new economic conditions that will arise after the war, and how they can best be met.—Discussion and Resolution.

Report of progress on: Uniform Municipal Accounting and Statistics.—Discussion and Resolution.

The balance of the session open for the reception of any new business, or resolutions from municipalities.

Tuesday, 2:30 p. m.

After the War—Industrial Session.

Short Addresses:

The Readjustment Period.

(a)—Municipal Revenue Difficulties.

(b)—The Munition Worker Problem.

(c)—The Returned Soldier Problem.

(d)—Federal Labor Bureaus.—Discussion and Resolutions.

Address:—Public owned Hydro-Electric Power as a Factor in the Material Building Up of a Community.—Discussion and Resolution.

Address: — Hydro-Electric Radial Railways, and Municipally Owned Street Railways.—Discussion and Resolution.

Tuesday, 8:00 p. m.

After the War—Patriotic Session. Public meeting and demonstration in some large hall, or in the open air.

Short Addresses:

(a)—The Responsibility of Citizens in this war.

(b)—A National Highway Across Canada, to serve as a Monument of the Fiftieth Year of Confederation.

(c)—Memorials to our Fallen Soldiers and Sailors.

(d)—Provision of Work for Returned Soldiers.—Resolutions.

Wednesday, 10:00 a. m.

After the War—Educational Session.

Address:—A Canadian Bureau of Information.—Discussion and Resolution.

Address:—The Teaching of Citizenship in Schools.—Discussion and Resolution.

Election of Officers.

American Association of Engineers.

At the adjourned meeting of the annual convention of the American Association of Engineers, Friday, July 13, the following officers were elected: President, Edmund T. Perkins, president Edmund T. Perkins Engineering Co., Chicago; first vice-president, W. H. Finley, chief engineer, Chicago & Northwestern Railroad; second vice-president, Isham Randolph, president Isham Randolph Co., Chicago: directors for term of two years: Paul P. Stewart, treasurer and chief engineer, Ketler-Elliott Erection Co., Chicago; R. C. Yeoman, dean of engineering, Valparaiso University, Valparaiso Ind.; W. W. DeBerard, western editor, McGraw-Hill Publishing Co., Chicago; C. A. Soans, with Affield, Powell, Graver & Affield, Chicago; H. G. D. Nutting, consulting engineer, Engineering Dept., Armour Inst., Chicago; G. C. Dooge, designing engineer, American Bridge Co., Gary, Ind.; directors for one year: F. H. Newell, consulting engineer, Engineering Dept., University of Illinois, Urbana, Ill.; L. L. Sherman, pres. L. K. Sherman Engineering Co., Chicago; H. W. Claussen, construction department, Engineering Bureau, City of Chicago; O. F. Gayton, president Utilities

Engineering Co., Chicago; A. D. Whipple, consulting engineer, Milwaukee, Wis.; A. P. Cunningham, Illinois Central R. R., Chicago; auditing committee: Chairman Samuel Morrell, bridge engineering department, City of Chicago; G. A. Gaenslen, bridge engineering department, City of Chicago; J. T. Mullin, Wisconsin Steel Works, South Chicago, Ill.

Several sessions of the convention over the adoption of a new constitution were held; finally the organization placed the matter in the hands of Isham Randolph, W. H. Kinley, R. C. Yeoman, H. G. D. Nutting and T. H. Williams, who succeeded in ironing out the difficulties and getting their proposed constitution adopted unanimously. The main provision of the new constitution is the enlargement of the number of Board of Directors from five to fifteen members, but the board may appoint five members to actively manage the affairs of the association. A clause to include associates is provided in the constitution. This membership pertains to men who are not necessarily engineers, but interested in engineering affairs and may be admitted up to 10 per cent of the certified membership.

Indiana Municipal League.

The twenty-seventh annual convention of the Municipal League of Indiana was held July 10-12 at Shelbyville. Samuel Spohn, mayor of Goshen, was elected president over Milo N. Feightner, of Huntington, by a vote of 27 to 14. Other officers were elected as follows: E. G. Bilby, mayor of Lawrenceburg, first vice-president; Thomas Carmichael, mayor of Aurora, second vice-president; Mrs. Kate Wood Ray, of Gary, third vice-president; Miss Vida Newsome, Columbus, fourth vice-president; Murrel Harlan, of Crawfordsville, treasurer. Washington was selected as the place for the 1918 meeting.

The first address of the meeting was given by Samuel E. Spohn, mayor of Goshen. Mayor Spohn made the declaration that local self-government for cities, under state regulations, should be incorporated in the forthcoming constitution for Indiana, suggesting that this would give greater opportunity for city beautification. A discussion of the mayor's subject was led by Councilman J. O. Pearson, of Shelbyville.

Alfred Bavis, president of the board of works, at Richmond, Ind., was the other speaker for the afternoon, his subject being "Motorization of the Fire Department." The discussion prepared by Mayor Wilson, of Wabash, who was not present, was read by Secretary Jones.

Many interesting papers were read at the second days' meeting. "Should Cities Be Limited in the Creation of Indebtedness, and to What Extent?" was the subject of a paper by William A. Bond, city attorney of Richmond. "I would not limit the indebtedness of cities," said Mr. Bond, "in acquiring by purchase or construction any utility therein supplying gas, water or electric current. There should be no limitation to the indebtedness of a city which is necessary in order to protect the lives, health and comfort of its inhabitants, but the fact of the existence of such necessity should first be determined by some impartial and competent tribunal if the existing indebtedness together with that proposed to be incurred equals or exceeds 2 per cent of the taxable property of such city as shown by the last preceding assessment for state and county taxes. For all other purposes the indebtedness of cities should be limited to 2 per cent."

Miss Ida Dunn Noland, of Logansport, president of the Indiana Suffrage Association, spoke on the subject, "What Official Positions in Municipalities Should Women Hold?"

"To persons who have studied the question of women in business and in the industrial world, it is clear the first step in the solution is to give women the defense of political recognition ev-

(Continued on page 69.)

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

SEWERS are to be constructed by Garretson, S. D., plans having been completed by C. A. Wagner, Sioux Falls, S. D.

A RESERVOIR is to be built by St. James, Minn., plans and specifications having been prepared by J. H. A. Brahtz, Mankato, Minn.

In constructing SEWERS, West Park, O., has the engineering services of E. R. Lander, 306 American Trust building, Cleveland, O.

Vallejo, Cal., is to increase its WATER SUPPLY by building a new DAM. The engineer for the project is O. Von Geldern, Pacific building, San Francisco, Cal.

Jefferson County, Pine Bluff, Ark., is extending its HIGHWAYS. The consulting engineers for the work are Lund & Hill, 527 Southern Trust building, Pine Bluff, Ark.

Oldham County, Vega, Tex., is to make extensive HIGHWAY IMPROVEMENTS. The engineers for the work are Hess & Skinner, Dallas, Tex.

Eastwood, N. Y., is making STREET IMPROVEMENTS following plans and specifications prepared by G. E. Higgins, 311 Wieting block, Syracuse, N. Y.

Jerome, Ariz., is to construct SEWERS following the preparation of plans and specifications by the engineers, Olmsted & Gillelen, Hollingsworth building, Los Angeles, Cal.

Johnson County, Warrensburg, Mo., is making DRAINAGE improvements. Clarke E. Jacoby Engineering Co., 527 Shukert building, Kansas City, Mo., prepared plans and specifications.

The Lewis Creek drainage district, Dyersburg, Tenn., in constructing DRAINS and SEWERS, has the engineering services of the Berthe Engineering Co., Charleston, Mo.

Ogilvie, Minn., is to install a WATER SUPPLY SYSTEM. The plans are being prepared by J. F. Druar, 312 Commercial building, St. Paul, Minn.

Mukwonago, Wis., is building SEWERS following the preparation of plans by W. G. Kirchoffer, 31 Vroman building, Madison, Wis.

Salem, Ill., is constructing WATERWORKS. Plans and specifications for the improvement were prepared by Caldwell Engineering Co., Jacksonville, Ill.

Farley, Ia., is to construct a SANITARY SEWER SYSTEM and DISPOSAL PLANT. The plans and specifications were prepared by G. A. Bishop, Oelwan, Ia.

A SEWAGE DISPOSAL PLANT being built by Leominster, Mass., was planned by the Green-Starr Engineering Co., 1530 Chestnut street, Philadelphia, Pa.

STORM SEWERS are to be constructed by East Conemaugh, Pa. Plans and specifications were prepared by O. P. Thomas, Leader building, Johnstown, Pa.

Improvements are to be made to the WATERWORKS of Clearwater, Kan. Plans and specifications were prepared by W. B. Rollins & Co., 209 Railway Exchange building, Kansas City, Mo.

STREET IMPROVEMENTS are to be made by River Rouge, Mich. The engineers for the work are M. L. Brown & Son, 820 Chamber of Commerce building, Detroit, Mich.

The Public Service Commission of Massachusetts is studying the revenue problems of the Boston ELEVATED RAILWAY. The commission has appointed John A. Beeler, 52 Vanderbilt avenue, New York, N. Y., as expert to assist it.

PERSONALS

Corby, Joseph, former mayor of Butte, Mont., died at that city June 29 after a short illness.

Hunt, Charles G., has resigned as chief engineer of the Augusta, Me., fire department and has been succeeded by Roy Small.

Lee, W. I., has been appointed assistant counsel to the New York Public Service Commission.

O'Neil, William J., has been appointed manager of the traffic bureau of the Syracuse, N. Y., Chamber of Commerce, succeeding J. William Grady, who resigned.

Pastoriza, Joseph J., mayor of Houston, Tex., died July 9, aged 60 years.

Totman, Dr. D. M., has been appointed city health officer of Syracuse, N. Y.

NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

ADJUSTABLE CORES AND FORMS.

Merillat System for Concrete Bridges and Culverts.

The Merillat adjustable core for concrete culverts is a collapsible steel form which can be adjusted to any size from 20 to 48 inches and a culvert of any intervening size can be built over it. The most important feature of this system is naturally its adjustability, since one outfit can be used for a great many of the ordinary sized culverts the contractor or county official is likely to find necessary. The investment in form equipment is thus greatly cut down at the outset.

The form is easily moved, being equipped with trucks on which it can be wheeled into position and with the aid of a plank loaded into a wagon—making the outfit very convenient to handle. The cores are made in eight and ten foot lengths and are always used in sets of two so that 16, 18 and 20 foot culverts can be built at one time, by using two eight-foot sections, an eight and a ten or two tens. Where longer culverts are necessary, they are first built the length of the core, and after the concrete has set, the forms are collapsed, moved ahead and reset.

The cores are substantially and durably built and will stand the usage to which they are ordinarily subjected for years. All operating parts are of malleable iron and there is no grey iron casting in the whole outfit. Every part that comes in contact with the concrete is heavily galvanized. The labor, expense and wasted time accompanying the use of wooden forms is eliminated and cost of repairs is practically negligible with these metal forms.

In using, a concrete base is poured into the proper sized trench. On this the core is placed and expanded to the right size merely by the turning of the hand wheel. At any size, it is always round, locked and braced. Concrete is shoveled around and over the core. When the concrete has set, the form is collapsed by reversing the hand wheel and removed. The work is already finished smooth and symmetrical and does not have to be fussed with as is the case with culverts made with wooden forms.

These cores have been widely used and contractors and road officials report success and economy. In Marion County, Kansas, for instance, a culvert 16 feet long, 3 feet diameter, with two retaining walls 10 feet long, cost $31.21 for material and $12.00 for labor—a total of $43.21.

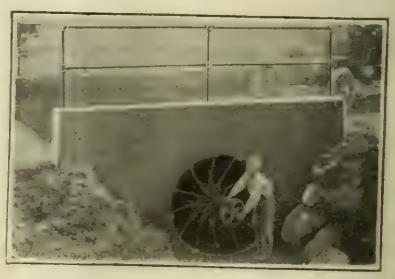
The Merillat adjustable bridge form is an arch adjustable to any size from six to 22 feet and a culvert or bridge of any intervening size can be built over it. It is made of the same material as the core. It consists essentially of a series of adjustable arches built of steel angles and malleable iron and a cover of heavy steel sheets reinforced with angle irons. It is readily collapsed, and while it is strong and heavy as a whole, no single part is too heavy to be easily handled.

The form may be set across the road at right angles or obliquely and in either case the retaining walls built at the end parallel with the side of the road will be parallel with the end of the form, which is frequently advantageous. The whole outfit can be set up in a few hours.

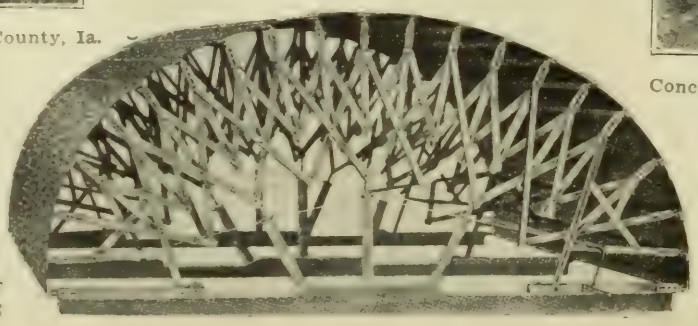
The accompanying illustrations show the bridge form and two examples of construction with the culvert core. One is a culvert 18 feet long located in Johnstown, O. The diameter is 3½ feet and the two retaining walls 12 feet x 5 feet x 10 inches—the cost was $45.30. The other is a 24-foot culvert in Dallas County, Ia., having a diameter of 4 feet and two retaining walls 16 feet x 7 feet x 12 inches. The cost of this was $89.

The forms and cores are made by the Merillat Culvert Core Co., Winfield, Ia.

Concrete Culvert in Dallas County, Ia.



Concrete Culvert in Johnstown, O.



MERILLAT ADJUSTABLE CONCRETE BRIDGE FORM

STONE SPREADER.

Burch Spreader and Distributor for Motor Trucks.

One of the troublesome problems in the use of stone in road construction is its proper distribution. The stone is usually dumped out in a heap and then men have to be put to work hauling the material from a place where it is too thick to where it is too thin. This generally results in wasted stone. At the present time, also, with the acute labor situation, much valuable time and labor cost is unnecessarily wasted by this method. The contractor using a motor truck may eliminate this loss and inefficiency by the use of equipment such as the Burch stone spreader and distributor.

In this device the thickness of the stone layer is regulated by the raising and lowering of the gate at the rear. The spreader is hooked to the truck by means of chains provided. The wheels and the shoe on each end serve to carry the load. It is built strong for heavy service.

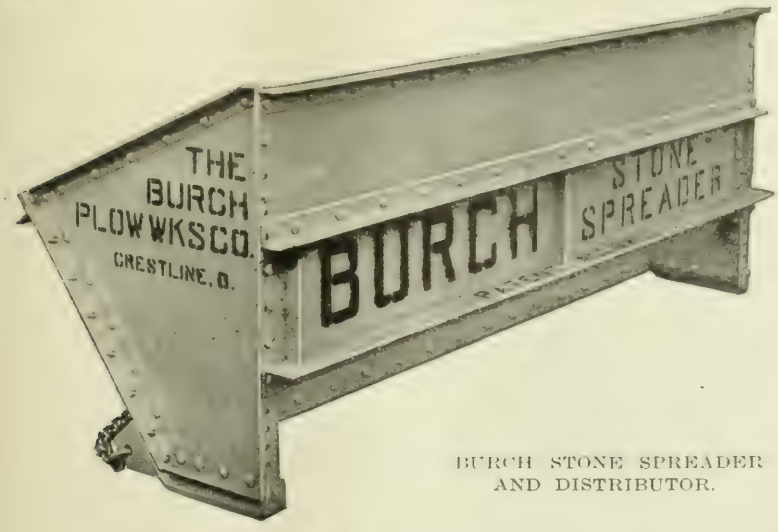
The machine is 7 feet 4 inches long and may therefore be used in connection with any type of truck. Most pikes will permit of double drive, so that the stone can be spread the entire width, leaving very little work to be done by hand. Even if the pike is narrow, however, and will permit of only a single drive, it is only a very small job, after distributing along the middle, to drag the stone with hooks or rakes a couple of feet each side. The accurate distribution by the spreader assures even layers.

The accompanying illustrations show the front and rear views of the spreader and the device in operation. The machine is made by the Burch Plow Works Co., Crestline, O.

INDUSTRIAL NEWS

Cast Iron Pipe.—Prices continue at the record high levels of last week. While private buying continues to a slight extent, municipal calls have practically stopped. Quotations: Chicago—4-inch, class B and heavier, $68.50; 6-inch, $65.50. New York—4-inch, class B and heavier, $68.50; 6-inch, $65.50. Birmingham—4-inch, class B and heavier, $63; 6-inch, $60; class A, $1 extra.

The Walter A. Zelnicker Supply Co., St. Louis, Mo., and affiliated companies are now represented in the Birmingham district by Mr. Thomas A. Hamilton, who for the past fourteen years has been connected with the Crane Company, prior to which he was superintendent of the Zelnicker Car Works, East St. Louis plant. Mr. Hamilton will have charge of both the buying and selling in the southeastern territory and his office will be at 1018 Woodward building, Birmingham, Ala.



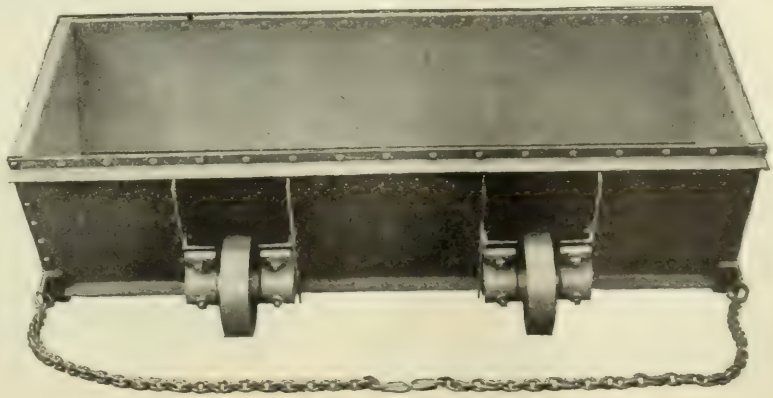
BURCH STONE SPREADER AND DISTRIBUTOR.

The Link-Belt Co., Chicago, Ill., announces that McCrossin & Darrah, American Trust building, Birmingham, now represent it in Alabama. E. Francis McCrossin and John F. Darrah are both experienced in Link-Belt engineering work.

To aid motorists in cutting down tire costs, **The Goodyear Tire & Rubber Co.,** Akron, Ohio, announces the publication of an entirely new and complete set of tire service bulletins, in which are set forth the various ways of obtaining more satisfactory tire service. A noticeable departure from a custom which has too largely prevailed in literature advancing tire information, or enumerating an array of "don'ts" for the tire user, is the positive viewpoint employed. The new Goodyear bulletins, instead of outlining the usual "don'ts," tell the motorist just what to "do" to get real tire service. Valuable hints telling how to add hundreds and even thousands of miles to the life of tires are the keynotes throughout the series. Naturally the more common tire ills are treated—individually and specifically—with full descriptions of just why and how they occur. More emphasis, however, is laid upon the remedy, and, what is more practical, the means of prevention. The new series of bulletins reflects a knowledge of tires and tire conditions gained only through years of experience in the tire business.

As a convenience to automobile owners, who wished to obtain big mileage from their tires, all Goodyear service stations have been supplied with these bulletins for free distribution. They will also be mailed free of charge from the main office at Akron, Ohio, upon request. The bulletins come in a series of eleven and bear the following captions, "How to Increase Tire Mileage," "Proper Inflation Pays," "What to Do for Tread Cuts," "Fabric Breaks," "How to Avoid Scraped Treads," "Premature Tread Wear," "How to Use Chains," "How to Make Inner Tubes Last Longer," "Rim Cutting," "Chafed Side-Walls" and "The Way to Maximum Mileage."

The General Electric Company, Schenectady, N. Y., has just issued bulletin No. 46,209, entitled "Thomson Direct Current Astatic Watthour Meters Types CS and CS-3." These meters, as described in the bulletin, have similar electrical characteristics, but differ materially in structural details, the Type CS being intended for switchboard work and the Type CS-3 for installations where front connections are suitable. Both types are constructed on the astatic principle to minimize the effect of external magnetic fields which are commonly encountered when dealing with large direct current circuits. Full information regarding construction and dimensions, as well as diagrams showing connections of these meters, will be found in this sixteen-page bulletin.



WHEEL ARRANGEMENT ON BURCH SPREADER.

NEWS OF THE SOCIETIES

(Continued from page 67.)

erywhere," she said. "Women in politics is no longer a matter of sentiment. It is a question of business, and no progressive municipality can afford to deny women the official positions they are so well qualified to hold, and which so much needs their service.

"Women are especially interested in their city government because of the close connection with their homes, which cannot be well ordered or conducive to the comfort or safety of the family unless the city government is well organized or executed.

"There are, however, some positions which the woman, alone, is especially fitted to fill. Soon after the passage of the act granting the women of Indiana partial suffrage, the good mayor of Logansport, where I live, appointed a police matron and a woman assistant health officer, and later the council elected a woman as a member of the school board. Woman is naturally fitted for these offices, for her mothering and housekeeping instinct helps her to deal successfully with any problem connected with women and children. Every city should have at least one police woman, a woman health officer, a woman as a member of the school board and women as members of the city council."

Judge William H. Eichhorn, of Bluffton, discussed "The Public Service Commission—What Should Be Its Duties and Powers?" He said "that in the very nature of things the interests of the public service corporations and of the people of the city which they serve are not identical. They are largely antagonistic to each other. The chief aim of the public service corporation is profit. On the other hand, the public to be served has for its chief

aim the largest service possible for the least compensation. Unfortunately the field of public service does not, and, from the very nature of the service to be performed, cannot afford free competition among possible rivals." He said the people of a city have some power to protect themselves from the service company through the franchise grant, but with an unequal chance for fairness on both sides.

J. B. Murphy, city attorney of Crawfordsville, spoke on "Ownership of Public Utility." "The one great trouble with the franchises," he said, "which were granted in many of our cities, and with a great many of the franchises that are owned today by public utilities in this state, is that fictitious values are placed on the privilege, which the public through its city councils and boards of trustees have granted, and the public is made to pay in the way of increased rates for the supposed value of such franchise with whatever additional values that could be placed on such utilities in addition to the actual cost of same. I am in favor of the ownership of public utilities by cities, and I am in favor of a provision in the fundamental law of the state providing that the indebtedness that is created for the purchase or the building of a utility, shall not be included as part of the constitutional indebtedness of such municipality."

Professor George I. Christie, of Purdue, state food director, made the closing address of the convention. He spoke on "Public Markets," and urged that municipal centers do all that is possible to prevent the waste of foodstuffs in their own community. He said it is not so much a question of how they do it as the fact that it is done. John W. McCarty, mayor of Washington, spoke on the subject, "The Best Method of Lighting the City."

Illinois Electrical Contractors' Association.

At the convention of the Illinois Electrical Contractors' Association, June 22 and 23, the following officers were re-elected: President, J. M. Pierce, Chicago; vice-president, J. C. Marron, Rock Island; secretary, L. B. Van Nuys, Peoria; directors, M. N. Blumenthal, Chicago; J. M. Crawley, Peoria, and E. R. Pendergast, Rockford.

Illuminating Engineering Society.

At the last meeting of the Council of the Illuminating Engineering Society it was decided that any member or associate member in good standing when entering the military or naval service of the United States or any of its allies may upon request before Oct. 1, 1917, or if called out after that date, have his name retained upon the membership roll, without payment of dues, during the year ending Sept. 30, 1918. The council voted to invest $1,000 in Liberty bonds.

In lieu of the regular annual convention, which has been abandoned, the society will hold a "correspondence convention." Papers prepared for this annual convention will be circulated among interested members in advance of publication in the Transactions, and written discussions may be submitted for publication. In this way the value of the papers and discussions will not be lessened because of cancellation of the convention.

U. S. CIVIL SERVICE.

Examinations will be held for the following positions:

Until further notice and on account of the urgent needs of the service, applications will be received for the following two positions at any time. Papers will be rated promptly and certification made as the needs of the service require.

Applications will not be accepted from employees of the Government or of firms or corporations engaged in carrying out contracts for the Government or its allies, unless accompanied by the written assent of the head of the office, firm, or corporation under which the applicant is employed to his appointment in case he should pass the examination.

Applicants will be admitted to these examinations regardless of their residence and domicile; but those desiring permanent appointment to the apportioned service in Washington, D. C., must have been actually domiciled in the State or Territory in which they reside for at least one year previous to the date of making oath to the application, and must have the county officer's certificate in the application form executed.

Physicist:

Present and future vacancies in the position of assistant physicist at $1,400 to $1,800 a year, and in the position of associate physicist at $2,000 to $2,800 a year, in the Bureau of Standards, Washington, D. C., and elsewhere, and in positions requiring similar qualifications, will be filled from this examination.

The vacancies to be filled are principally in the entrance grade, but persons showing in their examinations that they are unusually qualified are occasionally appointed at a higher salary.

Competitors will not be required to report for examination at any place, but will be rated on the following subjects, which will have the relative weights indicated, on a scale of 100: (1) General education and experience, 40; (2) Special training in physics and mathematics, 60.

Graduation from a full course in a college or university of recognized standing; and, in addition, postgraduate study in a university of recognized standing equivalent to that usually required for the master's degree or three years' service in a testing or research laboratory, or three years of teaching physics of college grade, are prerequisites for consideration for this position.

The college and graduate courses of study combined must have included mathematics through elementary differential equations and at least three years of physics.

Each applicant must submit an explicit statement of the course or courses pursued at college, and in addition, the applicant must arrange to have submitted directly to the Civil Service Commission confidential statements from at least two professors of physics under whom he has studied, or the dean of the faculty and one professor in the department of physics in which he has taught.

Assistant Inspector of Engineering Material:

Vacancies occurring in the Office of Inspector of Engineering Material at Boston, Mass.; Hartford, Conn.; Brooklyn, N. Y.; and Philadelphia, Bethlehem and Pittsburgh, Pa., at entrance salaries of $4 to $4.48 per diem, and in positions requiring similar qualifications at any navy yard or other naval establishment of the United States or in the department at Washington, D. C., will be filled from this examination.

Certification for filling vacancies, except in the department in Washington, D. C., will be made of the highest eligibles residing nearest the vicinity of the place at which the appointee is to be employed, except that upon the request of the department certification will be made of the highest eligibles on the register for the entire country who have expressed willingness to accept appointment where the vacancy exists.

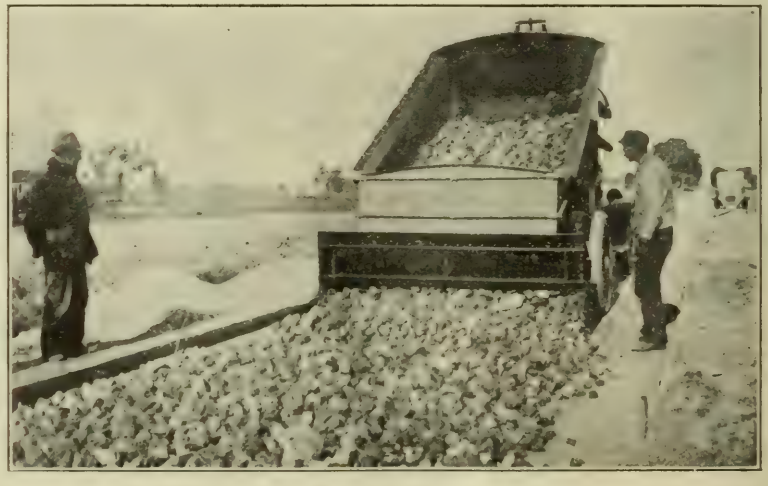
The duties of this position will consist in requiring contractors to carry out plans and specifications prepared by the Navy Department for machinery and engineering appliances, and passing upon tests of such apparatus and materials used in connection with miscellaneous engineering work for the United States Navy.

Competitors will not be required to report for examination at any place, but will be rated on the following subjects, which will have the relative weights indicated, on a scale of 100: (1) Education and preliminary training, 40; (2) Experience, 60.

To be eligible for this position, applicants must be able to understand fully drawings, specifications, schedules, and orders for engineering material, to conduct shop tests and make necessary calculations connected therewith, and be capable of writing reports with recommendations covering the inspections and tests made, especially as to all types of finished and unfinished metal materials, machine tools, instruments and auxiliary machinery supplied to the Navy Department.

Applicants must be graduates from a high school or have had four full years of study in a school offering a course equivalent to that of a high school, and have had not less than three years of practical testing and inspecting experience in the testing department of bureaus, engineering works, manufacturing concerns, or in the laboratories of technical schools; or have graduated in mechanical or electrical engineering from a college or university of recognized standing.

Applicants should state in their applications all the education, training, and experience they have had tending to qualify them for this position. Those with the minimum qualifications will be eligible for the minimum salary only.



BURCH STONE SPREADER AT WORK.

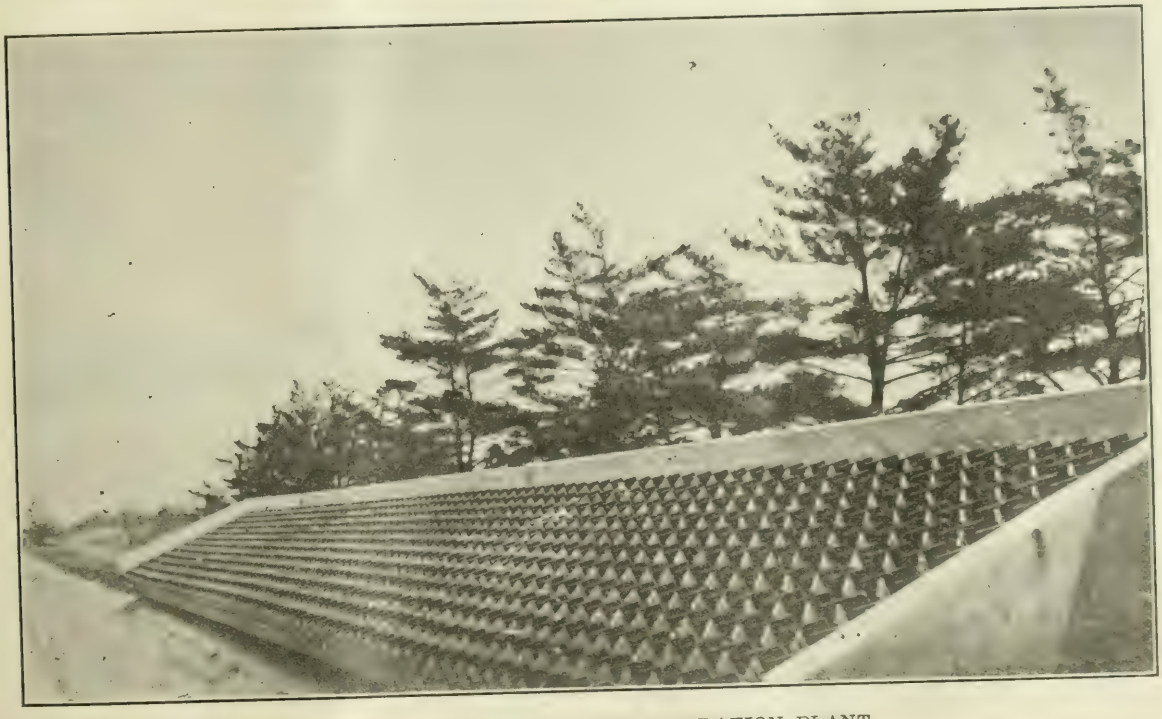
Municipal Journal

Volume XLIII NEW YORK, JULY 26, 1917 No. 4

THE NEW BRUNSWICK FILTRATION PLANT

Rapid Sand, With Capacity of Six Million Gallons a Day—Water Passes Over a Large Aerator Before Treatment—Wheeler Type of Strainer Bottom Used—New Pumps and Standpipe.

Work is now practically completed on the new filtration plant being constructed for New Brunswick, N. J., and it is expected that operation will begin in less than a month. The plant, which is the outgrowth of agitation extending over the past seven years for purification of the water supply, is of the rapid sand type and has a present capacity of 6,000,000 gallons per day, with provision for an increase to 8,000,000 gallons. In connection with the plant, a steel standpipe 85 feet high and holding 800,000 gallons was constructed for storage and pressure purposes.



AERATOR, NEW BRUNSWICK FILTRATION PLANT.

The city draws its water supply from Lawrence Brook at a point about one and two-thirds miles from the city. Above the intake, the brook has a drainage area of approximately 45 square miles, including much swamp area, which may account for a noticeable color in the water. The total storage, including mill ponds, is about 227,000,000 gallons, the available storage about 80% of this, and the daily yield in a dry year from 7,000,000 to 10,000,000 gallons. A stone dam forms the impounding basin, from which three 30-inch pipes lead at different elevations to a screened suction well close to the pumping station. A short canal connects the impounding basin with the wheel pit, furnishing water for driving a water power pump. Three 20-inch cast iron suction mains, one to each pumping unit, are connected to the suction well. There are two Worthington pumps of 4,000,000 and 3,000,000 gallons respectively, and a Barr unit of 6,000,000 gallons capacity which does most of the pumping. Water is forced through two 20-inch cast iron lines 8,500 feet to the reservoir, which is located on the top of the highest available hill. The reservoir was constructed originally in two basins with earth embankments, the inner slopes surfaced with clay and lined with stone laid in cement. Each half had a capacity of approximately 7,500,000 gallons, while the daily consumption is about 4,000,000 gallons.

Plans for the improvement provided for draining and

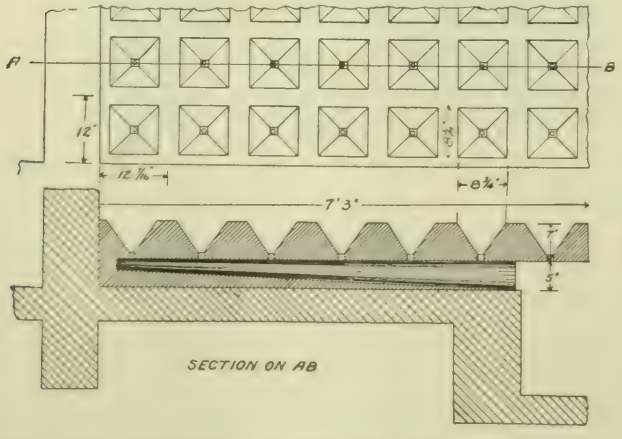
utilizing the west basin of the reservoir for the site of the filtration plant. The head house is a 3-story structure of reinforced concrete and brick, 63 feet 4 inches by 36 feet. On the first floor is the pump room and on the second the offices and laboratory as well as toilet facilities for the men, while the third floor is given over to space for chemical storage. The filter house in the rear is 30 feet wide and 62 feet long. Provision is made for eight filtering units, each 14 feet 6 inches by 24 feet, but for the present only 6 units will be operated. Each unit is designed to filter 1,000,000 gallons per 24 hours.

Except for the changes in the intake chamber of the reservoir, whereby the water level in the chamber has been raised, and the provision for aerating the water, no changes have been made in the general system. The change made in the intake chamber provides that the water in it shall stand several feet higher than that in the reservoir and be discharged over the aerator. The spillway of the aerator is 70 feet long and the crest is 7½ feet wide, with a slope of about 22 degrees. The water flowing over this spillway is broken up by fins or baffles of cast iron. These are about 6 inches long, 4 inches high and ½ inch thick and are set perpendicular to each other and at an angle of 45 degrees with the direction of flow of water. They are shown clearly in the illustration.

The water from the reservoir is taken through a 30-inch cast iron pipe to the influent chamber of the sedimentation basins, where it is dosed with alum and soda and passed into the two basins. These are each 31 feet wide and 100 feet long, with a depth of 17 feet. The capacity is 750,000 gallons, allowing a period of sedimentation of slightly over 4 hours at a rate of consumption of 4,000,000 gallons per day. Provision is made so that either basin may be cut out of service for a time, as for cleaning or repair.

Flumes, superimposed, lead the water from the sedimentation basins into a concrete influent flume located under the floor of the filter gallery. Simplex controllers located on operating stands at each basin control the rate of flow of the water onto the filters.

There are eight filter units, arranged four on each side of the filter gallery. Each of the units will be 14 feet 6 inches wide and 24 feet long and will have a capacity of 1,000,000 gallons per day. In most respects they are standard filters of the New York Continental Jewell Filtration Co., but the Wheeler type of strainer bottom is used, a type of construction employed in only six other plants—Akron, O.; Concord, Mass.; Belfast, Me.; Wilson, N. C.; Columbia, S. C.; and Chester, Pa. (now under construction). This strainer bottom is of the "hopper" construction and consists of inverted pyramidal depressions, the base of the pyramid being about



PLAN AND SECTION OF WHEELER STRAINER BOTTOM.

8¾ inches square and the angle between the sides being slightly over 70 degrees. Between the depressions are strips about 3¼ inches wide on the sides parallel to the filter gallery and 3 11/16 inches wide on the other sides, giving practically one depression per square foot or 336 for the 14-ft. 6-inch by 24-ft. unit. In each depression is placed five 3-inch balls, one in the apex and one in each angle between the sides. Above these are placed nine 1¼-inch marbles. (See Municipal Journal for May 27, 1915.) The object of this construction is to distribute the wash water over the entire area of the filter, permitting an upward velocity of such water of about 2 feet per minute without "blowing holes" in the gravel and allowing sand to settle down in these holes and later escape with the filtered water. The use of this type of bottom does away with the necessity of using air under pressure for cleaning the filters. Water from the standpipe will be used for this purpose.

The building of the bottoms is the most difficult part of the construction and great care is necessary. Each unit of the bottom occupies practically one square foot and the form for the depression is a machined iron casting, having a ¾-inch hole through the axis, through which a rod is passed. On this rod is strung a brass thimble—the only metal, excluding the reinforcing, to be left in the concrete—placed in contact with the apex of the pyramid above and, below, with a machined cast iron mandrel, into which the rod is screwed by means of a threaded top at the proper place (at 12 7/16-inch intervals) in the mandrel. This mandrel is tapering, about 4 inches in diameter at the larger end, and is used as the interior form for the water passage from the bottoms of the hoppers to the center channel of the filter unit. This is shown in the line cut.

In the construction of the new Brunswick plant, three of the inverted pyramids are fastened at 12 7/16-inch intervals of one mandrel, and 24 mandrels (with the pyramids) are laid parallel to and 12 inches from each other. Concrete is then poured, 72 units being cast at one time. After allowing the concrete (which is carefully mixed in the proportion of 1:2:4) some time to set, the pyramidal forms are raised slightly, then grout is poured in and the forms are set back in place. This process fills all bubbles and air holes and leaves a smooth and perfect surface.

After casting a triple row, as described, on each side of the filter unit, shorter and larger mandrels are used and double rows are cast alongside the triple rows. This leaves a center row, 2 hoppers wide and 24 long, extending the full length of the filter unit. A bottom form is necessary in casting over the drainage channel and a steel plate 3 feet long and 2 feet wide replaces the mandrels. When all but six of the bottom units have been cast, the large plate is replaced by a plate 2 feet by 1 foot and two more double sections are cast. The last section, 2 feet by 1 foot, is closed by a block cast outside and grouted into place.

Before putting in place, all forms are well oiled and after use are carefully cleaned.

On top of the balls and marbles, already described, is placed the filter medium. A thin layer of 1-inch gravel is spread immediately over the hoppers; over this 9 inches of carefully graded gravel ranging in size from ⅛ to ⅞-inch. Over all is 27 inches of sand.

From the filters, the water passes into the clear water basin underneath the filter gallery, thence through a Venturi tube, which controls the proportional feed device of the chlorine gas, into the clear water basin proper. Good arrangement of baffles practically eliminates dead water and insures a good mix of chlorine gas with water during the 250 feet of travel.

Three electrical pumps force the water from an intake well just off the clear water basin to the standpipe. Two of the pumps have a capacity of 6,000,000 gallons each and the other is half as large. All three are manufactured by the Kingsford Foundry and Machine Co., Oswego, N. Y., and are equipped with general electric motors.

The standpipe is constructed in close proximity to the filter plant. It is of steel, 40 feet in diameter and 85 feet high, with a capacity of 800,000 gallons.

Plans for the plant were made by Asher Atkinson, city engineer, and the New York Continental Jewell Filtration Co., engineers and designers of the filtering apparatus. The Hughes-Foulkrod Co., of Philadelphia, erected the concrete work and the superstructure. The plans for the standpipe also were made by Mr. Atkinson and the actual construction work was done by the Chicago Bridge and Iron Works. A. N. Whitlock is resident engineer at the plant for the Jewell Co.

MILITARY SANITATION IN THE WAR

Methods and Appliances Used by English and French—Disposing of Refuse—Burying the Dead—Providing Drinking Water.

In the June issue of the American Journal of Public Health, Thorndike Saville, assistant in municipal administration at Harvard University, presents an abstract of the only two volumes dealing with military sanitation which have been published describing the methods of the present war in France. One of these is an English book, entitled "Sanitation in War" and the other is a French one entitled "La Practique de l'Hygiene en Campagne." Mr. Saville states that neither of the books is published in the United States, although the English one is handled by Blakiston, of Philadelphia, and that no translation of the French work has yet appeared. In giving abstracts from these works, he has omitted those portions which concern medical rather than sanitary practice and also those which were common practice in the past and which are known to American sanitarians. This abstract occupies 20 pages of the American Journal and we are presenting below only the more essential features and those which seem most likely to be interesting to sanitarians generally. A number of the methods and appliances are similar to those described in Municipal Journal of June 14th and 28th, and these will not be repeated:

Disposal of Refuse. The disposal of the organic filth and refuse from kitchens and slaughtering places is best accomplished temporarily by quicklime, according to the French author. Indeed, quicklime seems to be used by the French for a considerable variety of sanitary ills, and they use it to a much greater extent than do either the British or Americans. Stable refuse is carefully carted at least a kilometer distant and in a direction opposed to the prevailing winds, where it is dumped on fields. Surface drains should be among the first permanencies of any camp.

Whitewash. The use of whitewash is apparently very extensive in the French army. Not only are all temporary outposts, stables, barracks, etc., kept whitewashed, but elaborate methods have been devised for the preparation of screened partitions for field hospitals or barracks, which consist essentially of a linen cloth fastened on a wooden frame work and whitewashed. A sanitary and translucent (but not transparent) partition is thus obtained. The whitewash is most successfully applied when there is added to it 1 to 2 grains of olum per liter, as this facilitates adhesion. White washed linen mounted on frame work serves many uses under front-line conditions, as for barriers, screens for officers' quarters and privates, for foundations of barricades, litters, etc.

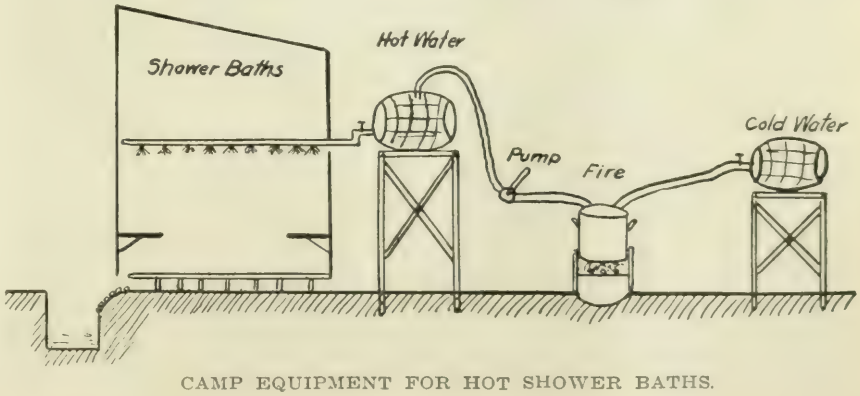
Burying the Dead. One of the most difficult problems is the disposal by burial of the enormous numbers of dead on the field of battle. The French have promulgated the following rules for burial in ground recently evacuated by the enemy.

A convenient site is chosen, as near as possible to where the men have fought. Corpses should not be buried near farms, sanitary structures, roads, rivers, water courses, or in places likely to be flooded. A silicious or calcareous region, dry, permeable, slightly sloping and studded with trees, is the best, if available. Unless specifically disapproved, common graves holding 100 bodies are used. In digging the trench, easy access of air and provision for circulation of ground water should be insured, the object being to promote bacterial growth, and hence rapid decomposition. For the same reason, the use of antiseptics on bodies is ordinarily forbidden. The clothing is removed from the bodies before burial, if possible. Ditches must contain only a single row of corpses and should be about 5 feet deep, 11 feet wide and 100 feet long. The main trench is drained by a small ditch in the bottom about one foot deep and lined with branches, stones, etc. At the highest point of this ditch an opening is left to serve as an outlet for the gases of putrefaction. It is well to cover the corpses first with branches, then with useless clothes, then charcoal, then turf and finally earth, the whole forming a depth of 3 to 5 feet and making a low mound.

Most difficult is the disposal of the dead lying between the enemy's lines and the first trenches, and those in the trenches themselves. Putrefaction of bodies in such locations is not uncommon. So far as possible, these bodies are brought in under cover of night and properly disposed of. Where the burial of bodies becomes impossible or recently interred bodies are uncovered, they are treated at once with an abundance of quicklime or 10% ferric sulphate; or better yet, with a one-twentieth creosol or formalin solution. A chloride of zinc solution followed by ferric sulphate produces antiseptic, mummifying and larvacidal conditions.

Many of the British officers believe that incineration of the dead bodies would be by far the best solution of the problem, but popular feeling prevents this.

Bathing. With the French army, both hot and cold baths are installed wherever the men are in camp for any length of time. Where conditions must be more primitive, small vats or tubs that happen to be at hand



CAMP EQUIPMENT FOR HOT SHOWER BATHS.

may be used. The water is warmed on the cook fire and the men are brought in groups of ten, undressed and scrubbed. In especially unfavorable conditions in cold weather, the bathing may be done in stables where the heat from the animals will maintain a comfortable temperature. For shower baths, a unique arrangement has been devised for use in the vicinity of the trenches, as is shown in Figure 1, consisting of two casks, a can for heating the water, a hand pump, and a pipe provided with sprinkling heads or outlets in a portable bath house. More elaborate arrangements are provided for the permanent encampments. There are also in the service some bath trains fully equipped for sterilizing the clothes, as well as bathing the men.

The French seem to be peculiarly concerned lest the men be not able to shave and obtain a hair-cut, and an indispensable adjunct of the bath is said by the author to be a hair dresser who "will complete the toilet of the men by trimming their hair." This care for the individual comfort of the soldier is a matter of detail to which both French and English officers devote an increasing amount of time and thought.

Insects and Vermin. Both the French and British have taken energetic measures to prevent breeding of flies, the methods commonly employed being destruction by poisons, fly paper, and larvicides, incineration of refuse, fly-proofing of quarters, and protection of foods. Destruction of rats is important in combating bubonic plague, which is carried by the rat flea. The safest poison is phosphorus, made up in 4% tablets, and sulphur dioxide is effective if it can be concentrated and confined. The French also use both a virus which is ingested by the rats with a treated food, and a toxic extract which is said to be efficacious. The French phosphoric paste is made by mixing 750 grams of flour with 750 grams of water and adding 8 grams of white phosphorus; to which mixture is added 150 to 200 grams of cheese paste and 100 grams of powdered sugar.

Typhoid is spread by the body louse or tick, and the following measures for its suppression are in use by the French: (1) Disinfection of cantonments abandoned by the enemy and medical supervision of prisoners for suspected cases. (2) Inspection of premises and of personal effects of the soldiers; installation of stations for disinfecting clothing of vermin; use of shower baths. (3) Careful de-lousing of hair and clothes of suspects by special contrivances; isolation of suspect or patient; enforcing absolute asepsis, by means of special clothing, etc., on all the medical personnel; general sanitary precautions to isolate the buildings containing suspects and patients. Removal of lice from the head is effected by an ointment of equal parts of kerosene and olive oil rubbed on the head and washed off in 24 hours; also benzine, kerosene, or 10 per cent acetic acid alone are effective. Lice in clothing are removed best by certain powders, one of which is 2 per cent iodoform, 2 per cent creosote and 96 per cent naphthaline. The young are destroyed by smearing seams with a grease of mineral oil 9 parts, soft soap 5 parts to water 1 part. Steaming or heat treatment also is efficacious.

Typhoid.—For preventing the spread of typhoid, the soldiers are required to be vaccinated with anti-typhoid. The British use two injections at ten-day intervals, one of 500 million dead bacilli and the second of 1,000 million. The French have found that two injections do not always protect and use four injections at intervals of 7 to 10 days. Only men in good health are inoculated, and they are given one day off following each injection. If local reaction is excessive, the English give 30 grains of chloride of calcium just before and six hours after the inoculation.

Antiseptics.—For dry antiseptics the French use chloride of lime as a deodorant, ferric sulphate to prevent fermentation and quick lime to destroy organic matter. Formalin solutions are commonly used as body disinfectants in washing, etc.

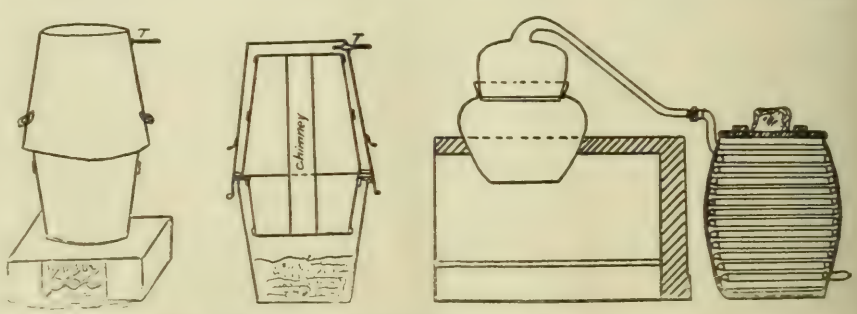
Chloride of lime is prepared by adding little by little 100 grams of chloride of lime to a liter of water, then diluting with water to 100 times the volume. Corrosive sublimate is used one part to 1,000. The addition of two grams of sea salt per liter adds to the efficacy by hindering the coagulation of albumen. Heavy coal tar oils in emulsion with water in proportion of 500 to 100 parts per 1,000 constitute primary deodorants.

Disinfection.—For field disinfection, the French use a portable Thresh steam disinfector which is capable of sterilizing 60 blankets at 100° C. The standard disinfectant used is liquor cresoli saponatus, having a carbolic coefficient of 12. This forms a stable emulsion and is used in proportion of 1½ ozs. to a gallon of water. Carbolic acid and formalin also are used in proportion of 8 ozs. of either per gallon of water. Disinfection of hospital wards after contagious cases, of ambulances, etc., is effected by the use of formaldehyde and sulphur dioxide in a manner similar to that practiced in the United States.

Two methods of dry disinfection are used which are shown in the accompanying illustration. That at the left consists of two conical parts, one inverted over the other. A closed chimney passes through the center and a thermometer opening is left at the top. Clothing or other things to be sterilized are placed around the chimney and a temperature of 100° C. is attained.

A more elaborate arrangement is that of Dr. Bordas, shown on the right. This consists of a retort filled with water, the steam generated by which passes through spiral lead pipes coiled about the inside of a wooden cask. Material to be sterilized is placed in the inside around a cylindrical log of wood, which is stuck up through the center. When ready for use the log is withdrawn, the cover is made tight and steam turned on. Temperatures of 106° C. to 108° C. are attained.

Water Supply.—As to water, the general rule is to consider all water polluted and to sterilize it. Signs are posted reading either "dangerous water" or "drinking water"; never "rinsing water" or "wash water." Sterilizing is accomplished by hypochlorite of lime or permanganate of potash, although the British do not favor the use of the latter. The French consider water to be potable if within the following limits, the figures being in parts per million; total permanent hardness, 15 to 30; hardness after half hour's boiling, 5 to 12; saline residue after four hours at



TWO METHODS OF STERILIZING BY DRY HEAT.

110° C. less than 400; chlorides as NaCl, less than 66; chlorides as chlorine, less than 40; sulphate as anhydrous $CaSo_4$, from 8 to 50; organic materials (as oxygen consumed by permanganate per million parts alkalinity), 2; nitrates, 0 to 15; nitrites, none; albuminoid ammonia, 0.05 to 0.10; bacteria from 100 to 1,000; B. coli, from 1 to 10 per liter.

The British author stated that bacterial and chemical examinations in the field were unheard of until the present war, but now motor laboratories are provided in which routine examinations may be carried on. These laboratories are not sufficient to meet all needs, and for reconnaissance, portable boxes have been devised containing necessary equipment to determine the total number of organisms and the minimum amount containing necessary fractors for 16 samples per day. Eight test tubes are provided for each water, one for agar for the total count, and seven for McConkey's taurocholate-lactose-litmus broth in amounts ranging from 0.5 c. c. to 20 c. c. The box contains also necessary incubators and sterilizers. All accessories and materials for examination of 500 samples are carried in another box. The total weight is a little over 100 pounds, and examination of sixteen waters per day is possible.

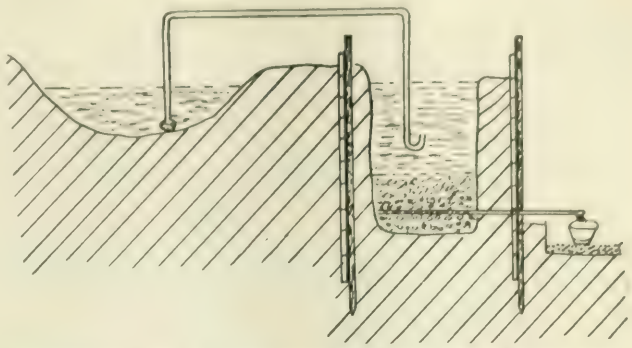
It is estimated by the British that the water requirements of the military force are as follows: each man requires per day 20 gallons in barracks, 5 gallons in standing camps when clothing is washed, 3 gallons in camps when no clothing is washed, 1 gallon in bivouacs for drinking and cooking only, 3 pints for drinking only (as a minimum), and 1 gallon during a march of 15 miles a day. For animals, the daily requirements are 10 gallons for a horse or camel, 8 gallons for an ox, 6 for a mule, 5 for a donkey and 2 for a sheep or pig.

It is suggested that the most likely place for water in hilly districts is the base of the steeper side of a deep valley, just below where the valley bifurcates. The most likely situations in a plain are the lowest depressions and points where vegetation shows the greenest, or where the morning mist hangs longest, or the midges are most numerous. The English volume referred to contains a brief description of the geological formations of northeastern France and Belgium in relation to water supply, which should be of great importance to troops in that district.

For purifying water, the simplest and most efficacious method is by boiling, and this is done in all temporary encampments. It is often best to make the water into weak tea, which is a better thirst quencher and more palatable than boiled water. On the march, the British practice is to boil the water in kettles during the night and fill the water bottles with this water. A second boiling then provides enough for the water carts. In the morning the unit moves with bottles full and carts containing sufficient to refill them, all the water having cooled and being sterile.

The most economical means of heat sterilization is by some apparatus whereby the heat of the outgoing sterilized water is given up to the incoming raw water. An apparatus similar to the Forbes-Waterhouse sterilizer in use in the United States army has been used by the British, but has been found unreliable, since the middle compartment may leak and raw water enter the outgoing stream without detection.

In the United States army, in large encampments of a more or less permanent nature, the Darnoll filter is used. This consists of a series of containers holding in all 20 gallons. There is a siphon action whereby the water is treated with alum and sodium carbonate, one pound to each 500 gallons. Most of the suspended matter and a large percentage of the bacteria are thus precipitated and the water is then filtered through flannelette bags. This apparatus is heavy and cumbersome and only mechanical purification is obtained. Where the ground is at all adapted to filtration, the British have evolved rather elaborate means of collecting water by building a revetment parallel to a side hill contour, siphoning the water into this from a nearby stream, and filtering it. The filtered water may then be delivered under some head. A section of such an arrangement is shown herewith.



SIPHONING AND FILTERING WATER FROM STREAM.

The British also advocate the use of the self-washing filter cone, such as is used at Toronto. Theoretically, this is most economical, but no results from its use in the army are given, and it has not been satisfactory at Toronto. The British and French both use filter candles of porcelain or prepared material, but their use is limited and the results are not altogether satisfactory.

Sterilization by means of chemicals has, after all, been found to be the most satisfactory method, and of all of the possible chemicals that have been used, bleaching powder has been found the most desirable and has been most used. To insure adequate sterilization by bleaching powder or hypochlorite, there should be one part of available chlorine per million parts of water. To allow for probable deterioration of commercial bleaching powder, a safe amount to use is 2 grams per 100 gallons (this being the capacity of the British water cart). The standard practice is to use 8.25 pounds per million gallons.

The English commonly use alum for clarification and hypochlorite for subsequent sterilization. To provide a simple, light and efficient apparatus for water purification and one easily erected, the Lister bag has been devised by the United States army. This is a heavy canvas bag supported on a tripod. Five spigots are set in the bottom with their ends projected about three inches above the bottom of the bag. Five soldiers at a time can use this bag. The bag is suspended and filled with water which should be clear. To the water is added in the form of a paste one grain of calcium hypochlorite, which comes in glass tubes containing 1 gram each. The bag holds 40 gallons of water. The disadvantage of the bag is that, while it sterilizes, it does not clarify.

Sodium bisulphate is considered by the British a most useful means of sterilizing water by use of a single tablet, and is especially valuable for troops, such as cavalry, which occasionally find themselves detached from their water carts. Each man carries a bottle of tablets and when refilling his water bottle, adds a couple of tablets and does not drink for a half hour. Adding 2 grams of the salt to the contents of an English water bottle gives 0.7 per cent free H_2SO_4, which destroys bacteria in half an hour. The tablets are made up with oil of lemon and saccharin, so that the solution tastes like lemonade. The objection is the liability to forma-

tion of soluble sulphate of toxic metals from the water bottles, nearly all alloys and metals being attacked. Aluminum water bottles should be supplied to men using these tablets, as the alum sulphate formed is so slight as to be of no consequence.

EMERGENCY ROAD CONSTRUCTION IN PENNSYLVANIA

Trying to Make a Record of Two Miles of Complete Construction a Week to Serve the Military Camp at Mt. Gretna.

In connection with the construction of the Mt. Gretna, Pa., camp, to be used in mobilizing cavalry, artillery and heavy supply trains by the military authorities, the State Highway Department of Pennsylvania was asked to provide 6½ miles of macadam road leading to the camp in the shortest possible time. State highway commissioner Frank B. Black, chief engineer W. D. Uhler and second deputy commissioner George H. Biles laid out a schedule that called for completing two miles of water-bound macadam road, 16 feet wide, each week until the road was completed, work to begin on July 1st. The work was carried along expeditiously, and at the end of the first week was ahead of schedule, when five days of almost continuous rain transformed the graded roads into seas of mud, and greatly delayed the construction. At the time of writing there are 300 laborers living under tents erected according to the military regulations, and fed by the National Guard Commissary Department. The State Highway Department equipment on the ground includes 12 traction engines, 10 rollers, 13 scrapers, 31 dump wagons, 22 auto trucks, 7 rooter plows, 9 sprinklers, 1 scarifier, 4 harrows, 4 drag scoops and 1 gasoline pump. Twenty car loads of material are arriving at the scene of the work each day, and all of the equipment is kept busy distributing it to the proper points.

"BRUSHING" THE RIGHT-OF-WAY, MT. GRETNA, PA.

ROOTER PLOW HAULED BY TRACTION ENGINE PREPARING SITE FOR OPERATION OF ROAD GRADER.

SPREADING SURFACE STONE WITH ROAD GRADER AND TRACTION ENGINE.

The road is built in two layers, the base being composed of slag. At the commencement of operations there was delay in securing the slag in the required quantities, and the State Highway Department practically commandeered a slag pile at Lebanon, and department men were put to work loading cars. Efforts to blast the crust of the slag with dynamite were not successful, as the dynamite spread its force through the loose slag under the crust, and the department put in a well-drilling outfit and, after drilling holes through the hardened crust and the loosened slag, used black powder in them, which successfully broke up the mass.

Secondly Deputy Commissioner George H. Biles is in charge of the work, and describes the methods used as follows:

"The work embodies principally the complete opening up of a new right-of-way, which requires that various operations must be carried on in order, namely, the section first must be brushed, trees removed, and stumps and rocks blasted out before the actual grading work can be taken up. Upon some of the sections this work is of magnitude, and requires a large organization to accomplish satisfactory results. When the right-of-way has been thus cleared, traction engines, with rooter plows, are started in to completely loosen up the surface. This is followed by traction engines and road machines, or graders, which complete the removal of the necessary material to the grade lines.

"All craters left by the removal of stumps and large rocks are filled with stone in order to ensure a solid sub-grade. Drains and culverts then are placed at the proper locations, and after this the large power rollers are put in operation, and the surface is thoroughly compacted. Upon the sub-base, after being properly prepared, the slag, which is being used for the base construction, is deposited in the center of the road in continuous stretches. This material is spread in two layers by these machines, which are drawn by traction engines, each layer being thoroughly rolled, and upon completion being about eight inches in depth.

"With the final rolling of the slag base, the surface of the slag is sprinkled, which tends to solidify or cement the material more uniformly. Upon this surface trap rock ballast is deposited in continuous piles along the center of the road, the same as was done with the slag. This also is spread in place with the use of the traction engines and road machines to a depth of about five inches.

"When the proper amount of material is secured, and the spreading is completed, a spiked-tooth harrow, weighing about four hundred pounds, is drawn over the surface of the road, back and forth, which eliminates the possibility of loose pockets. This operation is continued until the teeth of the harrow practically ride on the upper surface of the stone. Stone screenings then are spread lightly from piles at the sides, and this is followed by

sprinkling and rolling alternately, adding the necessary amount of screenings during the operation in order to bond up the ballast stone thoroughly. This course is four inches in depth when compacted. The rolling and sprinkling are continued until a surface mortar is produced, and the road shows no wave under the operation of the roller. When this is completed, the surface then is to be opened to traffic for a few days, and thereafter given an additional rolling and finishing in order to compact uniformly and completely all portions of the surface.

"Upon the finished road surface, after the fine material has been swept off, a bituminous treatment of four-tenths of a gallon to the square yard is to be applied with motor pressure distributor, using Department Class 'C' specification material, and covered with trap rock chips in quantities ranging from fifteen to twenty pounds to the square yard, applied with mechanical spreaders."

EARTHQUAKE BREAKS LOS ANGELES AQUEDUCT.

BY C. W. GEIGER.

A few days ago an earthquake occured in the Owens Valley region lasting for several seconds, accompanied by a long swaying motion of just the kind that had been anticipated. One hundred and sixty feet of the solid concrete flume that carries the aqueduct waters along the face of the Alabama hills was carried away. The downhill side of the pipe broke away and slid down about six feet. The upper portion of the pipe remained intact.

The question has often been asked by the people of Los Angeles as to what would happen if an earthquake should occur and break the aqueduct. The earthquake occured, and the break was repaired before the people of Los Angeles knew anything about it. The spot where this trouble occured has long been watched with anxiety. It is six miles above the Cottonwood power plant, and twenty-six miles above the Haiwee reservoir. The line of the aqueduct is well up on the face of the hills, but above it there has existed for untold years a little spring that sends out its trickling stream. Evidence exists that years ago a previous landslide occurred at this spot, and since then large trees have grown on the earth carried down the hill, and which has been shot well out onto the desert land. For a distance of 500 feet it was necessary to throw up an embankment from ten to twelve feet high when the railroad was built at the base of this hill. The earth for this purpose was taken from a borrow pit at the foot of the hill. This lessened the hill's support. The saturation of the earth above made earthquake action just the thing to cause a slide.

As soon as the quake was felt at the Cottonwood power plant and by the watchman along the line, observations were made, and within a few minutes the watchman in charge of the section where the slide occured was at the spot. He discovered the break in the pipe, and also saw evidence that a land slide would occur, and the water was shut off at once some distance up the line. Then the water-soaked earth gave way, and a great mass of rock and gravel slid down the hillside, and the lower portion of the pipe settled to a level six feet below its original position.

Within a short time after the slide occured the chief engineer was on the spot, and within a few hours steel pipe had been put into position along the section disturbed, and water was again turned into the pipes, carrying from 10,000 to 12,000 inches without any further trouble. The immense storage capacity of the Haiwee reservoir would have been amply sufficient for all purposes for a long period had there been no quick closing of the break.

This section will be reconstructed so that no further trouble need be feared. The pit made by the railroad grade construction will be filled, the material being taken from the top of the hill, above the adqueduct. This will strengthen the hill's support, and at the same time lessen its weight. A buttress of earth will be built below the spring and a subdrainage put in, so that the water may be collected and carried to the bottom by this means. The break is not an expensive one, but the work will be rather long-drawn out, as it is desired that the earth shall have ample time to settle before the permanent work is put in.

OKLAHOMA'S REGULATION OF WATER SUPPLIES AND SEWERAGE

New State Law Requires Approval of Water and Sewerage Plans by State Board of Health—Preventing River Pollution.

The state of Oklahoma this spring enacted a law for the protection of the public water supplies and regulation of sewerage which is in line with the most advanced requirements of other states in this respect. The general provisions of the act are given below.

No private party or municipality is permitted to supply water for domestic purposes, or let a contract for doing so, by means of works constructed in whole or in part or extended subsequent to the passage of the act, without a written permit from the State Board of Health. In applying for this permit they shall submit to the board maps, plans and specifications, and a description of the source from which the supply is to be derived, method of storage, purification, etc. Nor shall a new source of supply be added in any case without special permission. If the state board believes the proposed supply to be prejudicial to the public health it may refuse a permit; but if the parties consider the refusal to be illegal or unjust or unreasonable, they may, within 30 days, appeal to the district court, which court is required to render a decision without delay, either approving, setting aside or modifying the order, or fixing the terms upon which the permit shall be granted.

Supplying water contrary to the above provisions is a misdemeanor punishable by a fine of not less than $25 nor more than $50 for each day that the offense is continued. Letting a contract or contracts for any construction work, or doing any construction work covered by the above provisions without a permit, is punishable by not less than $500.

If anyone complains against the sanitary quality of any public water supply or the State Board of Health believes that such supply may be prejudicial to the public health, it shall investigate it, in which case every private or municipal party connected with the supply is required to furnish all the necessary information, and the state board may order such change in the source of supply or the manner of storage or purification as it thinks necessary. Such order may be appealed from to the district court as provided above.

In connection with sewerage, no private parties or municipality shall contract for construction work of any nature for a sanitary sewerage system or sewage disposal plant, or for any extensions of either, or permit any sewage to be discharged into any water of the state, without a written permit from the state board. The act, however, does not prevent the discharge of sewage from

a system which was in operation and discharging sewage on the first day of July, 1915; except that if the state board shall find that such system is polluting any of the waters of the state in a manner prejudicial to the health of its inhabitans, it may require the pollution to cease within a reasonable time, or require such treatment or disposition of the sewage as may be necessary to prevent further pollution. If any system is prohibited by the above provisions from discharging sewage, the state board, if it is its unanimous opinion that the general interests of the public health would be subserved thereby, may issue a permit for the discharge of sewage from that system into any water of the state; stipulating conditions under which the discharge may be permitted, if they think best. Such permit is revocable or is subject to modification and change by the state board after an investigation and hearing. An order to discontinue the discharge of sewage from an existing plant shall take effect after a stated length of time, but this must be at least one year and not more than two years.

For the purpose of carrying out the provisions of this act, the state engineer is to designate one of his assistant engineers for the State Board of Health, which engineer is to examine all applications, maps, plans, specifications, etc., and in general serve as engineer to the State Board of Health. (This method of providing the engineer for the state board is probably because it is assumed that the engineering work of the board will not require the entire time of one engineer.)

Suits under this act are to be brought in the name of the state by the attorney-general, and any fines recovered are to be paid into the school fund of the state. The act does not go into effect until September 30, 1918.

TAKING STOCK OF ROAD MATERIALS.

A few weeks ago Municipal Journal discussed the advantages which would accrue to the highway departments of states, counties and municipalities should the state or other governmental unit make an examination of all deposits within the state of materials suitable for road construction, determining the characteristics of each, the facilities offered for transporting the material to any section of the state, etc. We learn that such a stock taking of road materials for the entire Atlantic and Gulf Coast regions is now under way, with Dr. William Bullock Clark, the state geologist of Maryland, in general charge of the geological work, and Henry G. Shirley, chief engineer of the State Roads Commission of Maryland, in charge of the engineering work. The work is being done as a part of that carried on by the National Research Council, which was organized by the National Academy of Sciences, at the request of President Wilson, to assist the Council of National Defense.

The committee which is investigating road materials is known as the Committee on Available Materials for Rapid Railroad, Highway and Fortification Construction Behind the Front. In the investigation this committee is being assisted by the geologists of the different states and by the different state highway departments. While primarily the information is being collected as a war measure, it will undoubtedly be accessible to the state and local highway departments of all the states embraced in the survey, and will thus be of very great value to road work in the entire eastern part of the country. State committees, comprising the state highway commissioner or highway engineer of each state, together with a geologist connected with the state government or state university, have been formed in each of the states of Alabama, Connecticut, Delaware, Florida, Georgia, Louisiana, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, North Carolina, Pennsylvania, South Carolina, Texas and Virginia.

A. S. M. I. DURING THE WAR.

As was stated a few weeks ago, the executive committee of the American Society of Municipal Improvements, after consulting with the members in New Orleans (where it had been proposed to hold the annual convention this fall) and carefully considering various conditions, voted to postpone for a year the convention of this society, the 1918 convention to be held in New Orleans, the date to be selected by the committee later. At a meeting of the committee held a few days ago further consideration was given to the matter, and it was decided to substitute for the reading and discussion of papers at the convention the issuing of three quarterly publications to appear in October, January and April. In these will be published reports of committees (excepting such reports as may require adoption or other action by the society), and also papers which would have been presented at the convention had this been held. Members are requested to send in written discussions on the papers appearing in the October issue, to appear in that for January, and of those in the January issue to appear in that of April. Discussion of the papers in the April issue (and presumably further discussion of those appearing earlier also) will be asked for at the convention to be held in the fall.

This publishing of the papers will, it is hoped, satisfactorily take the place of the reading and discussion of the papers at the convention, and thus assist in maintaining the interest of the members in their society. One of the great advantages of the convention is, of course, the personal contact and intercommunication of ideas and the inspiration derived therefrom, and this the society will necessarily be deprived of this year; but it seems probable that the technical advantages derived by the members will be met even more satisfactorily, in some respects, by the publication of these several groups of papers than by the presentation of them in convention, where there frequently is not time for their adequate presentation and full discussion. For its members who would not have been able to attend the convention, it is believed that the service rendered will be much more acceptable than the publication of the papers and discussions several months after the convention, as would be the ordinary procedure.

COST OF OPERATING MOTOR VEHICLES

The annual report of the Commissioner of Streets and Bridges of Houston, Tex., for 1916, gives the cost of operation of motor equipment used in his department as follows:

	Repairs and supplies	Tires and supplies	Gasoline	Grease	Oil	Totals	Mileage	Cost per mile	Chauffeur cost	Total cost per mile
Com.'s Car No. 7063.	$347.92	$179.05	$167.27	$4.50	$37.37	$736.11	10,260	$0.07	.....	$0.07
Supt.'s Car No. 4489.	164.95	87.20	194.78	3.35	31.60	481.88	15,630	.03	.....	.03
Truck No. 4936....	906.70	178.41	622.35	135.81	3.90	1,847.17	14,180	.13	$2,160	.28
Truck No. 4437....	762.61	118.94	673.83	130.45	3.90	1,689.73	14,575	.11½	2,160	.26[1]
Motor Sprinkler and Flusher	774.49	381.12	706.99	92.00	3.90	1,958.50	11,371	.17¼	2,160	.36[1]

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Contributed Articles and Reports.

Contributions suitable for this paper, either in the form of special articles or as letters discussing municipal matters, are invited and paid for.

City officials and civic organizations are particularly requested to send Municipal Journal regularly their annual and special reports.

Information Bureau.

Municipal Journal's Information Bureau, developed by twenty-one years' research and practical experience in its special field, is at the command of our subscribers at all times and without charge.

MAKING THE BEST OF NECESSITY.

Sometimes instead of going to considerable expense to prevent a certain occurrence, it may be better to invite or at least permit it and take precautions to control it—perhaps even to use it to advantage.

An illustration of this is the so-called "low-water bridge" used in the southwest. Instead of making a long bridge with numerous high arches to pass the great floods of the "flashy" streams that sweep through wide, flat valleys, engineers in that section build a low bridge with one or two arches that will carry the ordinary volume of flow; then when the flood comes it sweeps over the top of the bridge and its approaches, which are prepared for such occurrence. The bridge is out of service for a day or two, it is true; but one that would pass the entire flood through its arches or spans would be prohibitive in cost.

Another instance of making the best of the inevitable is offered by a roadway which a city engineer constructed to serve as a stream channel during infrequent floods of a small mountain brook. Instead of providing a large and expensive storm sewer to carry these occasional floods down a side street that ran up into a notch in the hills, he built a small sewer to carry the ordinary run-off; then built the roadway dished in the middle with high integral curbs, and carried it to a stream that passed near its lower end. This roadway carries the heaviest floods without damage to any property, and cost little if any more than one of standard construction.

These two solutions of difficult problems can probably be applied successfully to similar conditions elsewhere. But the most useful application is that of the general idea: Unusual conditions can frequently be met best by unusual methods. It is sometimes advisable to drop standard methods entirely and strike out along original lines. This requires more skill and engineering knowledge to make sure that the new ideas are practicable and will not cause unexpected and undesirable consequences; but the engineer should welcome such tests of his ability.

SANITATION OF HEALTH RESORTS.

At this period of the year occurs what is sometimes referred to as a "summer typhoid" epidemic, the cases of typhoid in a number of the large cities showing a considerable increase at this season. There are probably several causes for this, but perhaps the most important one is the unsafe water supplied at the health resorts visited by large numbers of city dwellers. This condition has produced serious results in the past, but it seems probable that the change in summer habits which has been brought about by the more general use of the automobile will make it one of increasing danger. When it was the practice for most vacationists to spend their one or two weeks at a single resort, dangerous water at one of these would affect only the few who spent their summers there. But a large and increasing number using the automobile make stops of only a night or two at any one place, and thus increase five or ten-fold the probability of their imbibing water from one of these impure supplies.

Under either condition, it would seem that every State Board of Health should recognize it as its imperative duty to insure as far as possible the safety of water supplies in all hotels and boarding houses used by the public in their summer outings. This, of course, means an immense amount of work, as the takers of "summer boarders" are numbered by the thousands in many states; but by continuing the examinations throughout a large portion of the year, it should be practicable to examine at least all of those upon the main highways. A suggestion in this connection is the automobile laboratory used by the State Board of Health of New Jersey, and described in Municipal Journal for May 24th, by which the entire state could be covered.

OUR WESTERN EDITORIAL REPRESENTATIVE.

Municipal Journal has added to its editorial staff, as western editorial representative, Charles Carroll Brown, for about twenty years editor of "Municipal Engineering." Mr. Brown has sold all his interest in the latter periodical and severed all connection with it, and will assist in keeping Municipal Journal the leading municipal periodical.

THE CATERPILLAR IN ROAD CONSTRUCTION.

The State Highway Department of Pennsylvania was trying to rush through a new highway in a clay country for military purposes. It had cleared the right of way and graded several miles, and constructed part of it, when a five days' rain fell on the clay sub-grade . The result was a practical halting of the placing and rolling of macadam, since the teams cut the clay into a mire.

This experience suggests a method by which it would seem to be possible to continue work under such conditions. This is the use of the "caterpillar" type of vehicle for hauling material onto the sub-grade. If the clay is surfaced so that it will not hold water in puddles, as soon as the stone is placed it should be possible to level and roll it without any difficulty. The same plan should also, it would seem, work to advantage on a dry sandy road, which material also is cut all out of surface by the passing of a few wagons. The caterpillar tractor has given good service in the west, and there is no question concerning its practicability.

The WEEK'S NEWS

State Road Progress in Texas and Nebraska—New York City to Pay for Sidewalks—Baltimore to Improve Health and Housing—Reducing Child Mortality in Newark—Increased Gas Rates in Massachusetts Cities—To Study New York City's Traffic—Seattle's Municipal Railroad—Municipal Aid in Massachusetts Food Problems—Ohio Flood Protection Litigation Ended—Yonkers Wins Its Smoke Abatement Fight—Recreation in Cities in United States—Spokane Committees Study Food Questions.

ROADS AND PAVEMENTS

Court Upholds Texas Road Law.

Austin, Tex.—The constitutionality of the law creating the state highway commission has been upheld by Judge George Calhoun in the Fifty-third district court in an opinion rendered in the injunction case of P. S. Atkins against Curtis Hancock, chairman, and other members of the state highway commission. Judge Calhoun refused to grant an injunction to plaintiff to restrain the collection of the license tax. The court held that in passing this law the legislature acted within its legislative powers and there is nothing in the act repugnant to the constitution; that it is one of the functions of the government to establish and maintain public roads, "and that over said roads the state by and through the legislature has absolute control," and may rightfully prescribe uniform regulations necessary for public safety and also charge a graduated fee for the registration of motor vehicles. The court held also that the legislature was acting within the police power of the state in the enactment of the law. Continuing in the opinion the court says: "And it further appearing to the court that the acts attacked herein by the plaintiff as being unconstitutional are not violative of the constitution of the state of Texas but come within the police powers of the state, and that therefore in passing the laws attacked in this suit by the plaintiffs as being unconstitutional the legislature of the state of Texas was acting under the exercise of police power uniformly recognized as belonging to the states and essential to the preservation of life, health, safety and comfort of the citizens of the state of Texas." The plaintiff gave notice of appeal to the third court of civil appeals.

Each County Must Have Highway Commission.

Lincoln, Neb.—Under a new law, passed by the legislature, the board of county commissioners of each county and supervisors are required to designate certain roads in their respective counties as "county roads," which shall be maintained at the expense of the county. The State Board of Irrigation, Highways and Drainage is empowered to consider and decide objections on the part of freeholders to such designations. The county boards are required to appoint county highway commissioners and to establish a complete system of county roads. "The board of county commissioners or supervisors of each county shall, within one month after the taking effect of this act, select and designate from the laid out and platted public roads within the county certain roads to be known as "county roads," which shall be direct highways connecting cities, villages, and market centers, and shall be main traveled roads. These are to be plainly marked on a map, and said map shall be deposited with the county clerk, and open to public inspection." Hearings are to be held. Any ten freeholders of the county may file a petition with the county clerk asking for any change in designated roads, setting forth the reason, accompanied with a plat showing such proposed change. "If no agreement is reached between the county board and the petitioners at said hearing, the county clerk shall forward said map, together with all petitions and plats, if any, to the State Board of Irrigation, Highways and Drainage. If no objections are filed and no hearing had, or if an agreement is reached, the roads so designated on said map shall be conclusively established as such county road. "The decision of the state body will be final. All county roads designated in accordance with the act are to be maintained at the expense of the county. The boards of county commissioners or supervisors may, at any time, add other roads to the county road system provided for in this act, but the same procedure must be followed. The total mileage included in the county road system must not exceed twenty per cent. of the total mileage of all the public highways within the county. "It shall be the duty of the boards of county commissioners and supervisors to purchase and provide suitable adequate graders, rollers, and all other machinery, tools and appliances necessary for the efficient maintenance and repair of the county roads; and it shall be the duty of the county highway commissioner to devote his time constantly to keeping the system of county roads in perfect condition and repair, and to see that they are regularly dragged. As soon as the county roads have been designated and established the roads are to be divided into sections, designating each section by some appropriate number, name or letter, and clearly designating the starting point and terminus of each such section, and this designation shall be recorded at length by the county clerk in a county road book. The county highway commissioner is then to proceed to survey the roads and report to the county board of commissioners or supervisor the plat for the road, bridge, tile and culvert work theron. Such survey and report shall be the basis and with the object in view of the permanent improvement of such roads, as to bridge, culvert, tile and road work. Such survey and report shall consist of an accurate plan and profile of such roads showing cuts and careful attention to drainage, and said plan and profile shall show all existing bridges, culverts and grades."

Commission Paves Streets Against Protest.

Ogden, Utah.—Property owners in paving district No. 125, have lost their suit to prevent the paving of the district and the collection of special taxes to pay for the improvements. The construction work, which was begun a few weeks ago, will be rushed to completion on orders from the city offices. The property owners, who objected to the improvements, contended that the front feet owned by objectors represented 67½ per cent of the total frontage. It was the contention of the city that the number protesting was less than two-thirds. Since more than two-thirds of the property must protest to prevent the improvements the city held it had the right to proceed with the paving. Hundreds of property owners are affected by the case since the district includes fourteen blocks to be paved with asphalt. The trial was marked by frequent expressions on the part of the objectors, indicating great bitterness toward the city commissioner. The case may be taken to the supreme court. Papers filed in the case in the district court show that on February 14, 1917, the city engineer made a report to the city commission that owners of property protesting against the paving with frontage on the paving district, amounted to 67.12 per cent of the property owners of the district. Records in the case show that on and prior to, February 5, 1917, more than 66 2/3 per cent of the property owners had protested against the paving; and that prior to the time the city commission took action on the matter, others had filed protests against the paving work, which brought the total number of protests up to more than 80 per cent of the frontage on the paving district. Despite the sentiment against the paving work, the commission went ahead with its plans. Mayor Abbott R. Heywood and investigators discovered that one of the property owners in the paving

district had transferred part of his property to his wife after he had protested against the paving. She made affidavit that she also was opposed to the paving. The commission threw out her protest and refused to count the frontage as being against the paving work. O. J. Stilwell, officer in a realty company registered his protest against the paving work. The city commissioners decided that technically the realty company should have done the protesting, instead of Stilwell. So it was with other similar protests. Mayor Heywood by legal objection succeeded in pruning down the number of protestants until the number was just a little less than 66 2/3 per cent of the property owners in the district.

City to Make Sidewalk Repairs.

New York, N. Y.—Despite an adverse report of the committee on thoroughfares, the board of aldermen has adopted an ordinance providing for the repairing of sidewalks at the expense of the city instead of the owners of property facing public streets. This measure, introduced by alderman Charles H. Haubert of Brooklyn, had been pending for more than a year. Numerous public hearings, conducted by the committee on thoroughfares, were held on the matter and there appeared to be an overwhelming sentiment on the part of property owners in favor of the proposed change in the law, but the committee was not convinced and it recommended the filing of the ordinance. In its report the committee said: "It is the consensus that the change would be of little benefit. It might directly relieve a considerable number of property owners, but would cause a considerable increase in the tax rate, and thereby increase the burden of all taxpayers." There was a question as to whether the board of aldermen had the power to change the law relating to the repaving of sidewalks, and the corporation counsel was asked to render his opinion. It was favorable. There are no definite figures on what it will cost the city to keep the sidewalks in Greater New York in repair. Some estimates have gone as high as $2,000,000 a year, but alderman Haubert claims that the cost will be less than a million dollars.

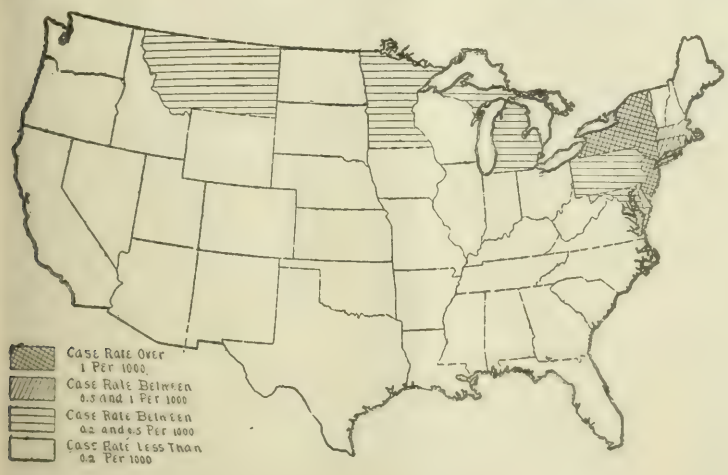
SEWERAGE AND SANITATION

Fight Over Site of Disposal Plant.

Wilkes-Barre, Pa.—Hanover township has the right to erect its sewage disposal plant on a site purchased by the commissioners, according to a decision handed down by judge Strauss in which he holds that the court has no legal right to impose its judgment upon the township authorities in view of the fact that their action cannot be considered as arbitrary, unreasonable or without fair cause to support it. The judge dismisses the preliminary injunction against the Hanover commissioners. In deciding the case against the plaintiff the court holds that he had not established by proof that a system of sewage disposal such as designed for the plant in question would permit foul gases and stenches or interfere with the actual comfort and health of persons living in the immediate vicinity, although he had proved that the establishment of a sewage disposal plant damages the value of real estate for sentimental reasons. The action was taken by the plaintiff after the township commissioners had awarded a contract to build its sewer system and had bought the land for the disposal plant. He was joined by others. The city of Wilker-Barre, while not appearing as a plaintiff, gave testimony to show that the disposal plant would affect its growth. While deciding in favor of the township Judge Strauss holds that perhaps Hanover township and Wikes-Barre city would benefit in the long run if a more southerly site were selected even if it might entail an additional expense of $100,000. The construction of a sewer system and disposal plant was not objected to by the plaintiffs in general. The objection was against the site, the plaintiffs suggesting that a point below Breslau be agreed upon by the township commissioners for the proposed plant. Judge Strauss took up the matter of changing the site with the commissioner of health and the state officials were favorably disposed, but the township officials concluded not to make application for the change of site.

Report on the 1916 Poliomyelitis Epidemic.

Washington, D. C.—The United States Public Health Service has just published a brief report on the epidemic of infantile paralysis which swept sections of the country last summer. The statement says: "The year 1916 was one characterized by an unusual prevalence of polomyelitis throughout the United States. In many localities the discase became epidemic. Polomyelitis has been with us for several decades, occasional cases being reported here and there throughout the country during all months of the year. There have usually been more cases in the summer than in the winter months. The principal epidemic area last year comprised northern New Jersey, southern New York, and most of Connecticut, Massachusetts and Rhode Island. Special interest in the disease was aroused about the first of July by its unusual prevalence in New York city. The New York city epidemic began about the middle of June. Early in July increasing numbers of cases were being reported in Newark and Jersey City, N. J., and neighboring communities. By July 15 the disease was on the increase in Philadelphia, Bridgeport, Camden and Toledo. By the first of August cases were being reported in Baltimore, Boston, Chicago, St. Paul and Minneapolis, Providence, Syracuse and Trenton. The disease was at its height in July, August and September. In December, after the disease had subsided elsewhere, an outbreak developed in the northeastern part of West Virginia with foci at Elkins, Grafton and Fairmont. The localities which were particularly invaded during 1916 are shown on the accompanying map. Billings, Mont., which is not on the map, also had a considerable outbreak in proportion to its population. It is interesting to note that a greater number of cases was reported during the first four months of the year in Vir-


Case Rate Over 1 Per 1000.
Case Rate Between 0.5 and 1 Per 1000
Case Rate Between 0.2 and 0.5 Per 1000
Case Rate Less Than 0.2 Per 1000

Relative Prevalence in States.

Localities Attacked by Disease.

THE POLIOMYELITIS EPIDEMIC OF 1916.

ginia than in any other state. In a few of the states there was an increase in the occurrence of the disease during May and June, but in most of the states the distinct increase began in July, and in Maine and Vermont not until August. The highest reported case rate for the year was in New Jersey, where there was a rate of 1.376 per thousand population. The next highest rate was that of New York state with a rate of a little under 1.3 per thousand population. Connecticut came next with a reported rate of 0.764 and Massachusetts with a rate of 0.518. Rhode Island was about as heavily infected as Connecticut and Massachusetts. Maryland, Michigan, Minnesota, Montana and Pennsylvania had reported case rates of between 0.2 and 0.5 per thousand population. The other states in which records of the prevalence of the disease were kept had reported case rates of less than 0.2 per thousand. The relative prevalence of the disease in the several states, based upon the number of cases in proportion to the population, is shown in the other map. The more densely shaded states represent those having the heaviest infection. The states without any shading whatsoever represent those in which the reported case rates were less than 0.2 per thousand population or in which the disease is not required to be reported and its prevalence is therefore unknown.

Move for Better Health and Housing.

Baltimore, Md.—Civic forces in the city are uniting for more rapid progress towards better housing. Recently at a well attended meeting of the mayor's Committee on Public Health and Housing this report was presented: "The matters which the general committee can take up at the present time with the greatest advantage to the community are: (1) The question of housing conditions; (2) The development of small parks in several districts of the city; (3) More adequate municipal hospital facilities for advanced cases of tuberculosis; (4) Greater hospital facilities for other infectious diseases; (5) The question of further development of the teaching of hygiene in the public schools; (6) The question of feasible economic diets for the general population. In regard to the general housing conditions, it was decided that in addition to the committee already appointed to investigate and report on the Washingon Building Company's plans that it is desirable to investigate the feasibility of establishing in Baltimore an Octavia Hill Association for better housing." The conferring members agreed that it is necessary to have more accurate information in regard to the distribution of tuberculosis, and gastro-intestinal diseases in children, before an attempt is made to decide in what parts of the city and in what specific areas additional small parks may be established to the best advantage. A special worker provided for by a member of the committee under the the direction of the Health Department, has completed a card index of the fatal cases of tuberculosis for the past three years, and with the assistance of this index a pin map of fatal cases of tuberculosis is being prepared. This will be ready in a short time. The health department's maps of living cases of tuberculosis reported to the department and visited by the city nurses during 1916, is now in course of preparation. When these, and a similar pin map showing the deaths from gastro-intesinal diseases in 1916, are completed material will be at hand for the work of the sub-committee to be appointed on small parks. These maps will also be valuable for use by the sub-committee on housing.

Child Hygienic Work Reduces Infant Mortality.

Newark, N. J.—Continued reduction of the city's infant mortality rate is shown by a tabulation of deaths of babies under one year of age for the first quarter of this year, just made by the division of child hygiene of the board of health. The rate is 82.5 deaths per 1,000 births, as compared with 94.8 for the first quarter of 1916. The total of births for this period was 3,079. Of these babies, 2,393 came under the hygiene bureau's supervision, and thirty-four died. However, while all these deaths are included in the department's reports, thirteen infants died in the first few days of life, before the bureau's nurses had even called. If the thirteen are omitted, the death rate becomes 8.7 for supervised babies. As an explanation of the great reduction effected, Dr. Julius Levy, director of the bureau, points to the prenatal care given by the bureau and the cumulative effects of the intensive work among mothers. Much has also been accomplished, Dr. Levy feels, by the supervision of midwives and the organization of an association among them for the purpose of stimulating them to higher standards, affording them opportunities to attend special lectures arranged by the bureau, and providing a supervisor of their work. Dr. Levy has urged that the laws be altered to permit his division to hold the power to revoke the licenses of midwives, but this suggestion has not the approval of the state board of health, which claims this city is the only one in the state organized with a special division for infants, and that women disqualified here could practice in the immediate suburbs. The division has published a "Baby Primer" which it prepared and which was printed and is being distributed by the Prudential Insurance Company of America, which has its home offices in Newark. The booklet emphasizes the need of proper registration of births and care of eyesight at birth; describes the proper methods of feeding; warns of attention to clean sources of milk supply; describes correct methods of handling milk and urges cleanliness, fresh air and protection from flies and mosquitoes. The primer is practically a duplicate of the division's exhibit. It is very attractively gotten up and the terseness and simplicity of its teachings are proving strikingly effective. Much of the division's work has been with mothers in neighborhoods of large foreign population and the value of the advice and also the educational methods is convincingly demonstrated by the marked success in reducing infant mortality. The work is organized on a district basis.

WATER SUPPLY

Water Plant Cancels Loan Due 1930.

Providence, R. I.—Although it is not due until May 1, 1930, the city has called in and paid off considerably more than half the $2,666,000 water refunding loan. Only $1,127,000 of the issue remains outstanding. City treasurer Clarke is buying in the bonds wherever he can find them and they are being cancelled by the city council finance committee. The issue bears interest at only 3 per cent, and consequently the city is not meeting the usual difficulties in obtaining the bonds at a satisfactory figure long before their maturity. The original issue was floated to refund two old bond issues sold by the city in 1866 and 1869, respectively, to provide funds for the construction of the present municipal water supply. These two issues aggregated $4,000,000, and when they came due the sinking funds were not sufficient to meet them and the refunding of more than half the amount was necessary.

City Loses Against Waterworks Contractor.

Cozad, Neb.—The State Supreme court has decided that this city must pay the contractor, the Katz-Craig Contracting Co., the full amount of the final estimate given by the engineer whom the city retained to supervise the work, and that claims for deductions made by the city after the final acceptance of the work by this engineer are invalid. The contract provided that final payment should be made upon approval and acceptance of the work by either the city council or the engineer. The engineer accepted the work and the city council intended to do so, but was prevented from making the final payment by the mayor. The city, however, took over the waterworks and used it from the time of its acceptance. The court held that the city was estopped by this action from claiming that the work was not satisfactory. It held that where a supervising engineer is employed by a city to inspect and approve construction work, and is named as the sole arbiter between the contractor and the city, his final estimate is binding upon the city as well as upon the contractor, unless fraud can be shown. The case has been in the courts since 1911, although the total amount involved is not as much as $7,000.

City Wins Water Rights in Court.

Denver, Col.—The state supreme court has decided that the city of Denver is entitled to $200,000 worth of water rights in the city's irrigation ditch which Sherman Brown, clerk of the district court, and others attempted to appropriate. In its decision the court severely criticised the lower court for attempting to ignore the order in the city ditch case, after it had reversed the decision of judge George W. Allen. Judge Allen since has been elevated to the supreme bench, and he, together with supreme Justice Scott, did not participate in the ditch case. The opinion censures the lower court and the city attorney's office, then represented by I. N. Stevens, that modification of the mandate such as originally ordered by the supreme court, was a direct blow at the "harmony of the judicial decisions." The case was decided in judge Allen's court in favor of Sherman Brown and others on their assumption that they had priority claims to the water rights. The city appealed and the supreme court reversed the findings of the lower court, directing that tribunal to decide the case in the city's favor. When city attorney James A. Marsh took up the case he found it necessary, because of certain modifications granted in the meantime by judge Sheafor of Colorado Springs, sitting for judge Allen, to demand original jurisdiction from the supreme court in the matter.

STREET LIGHTING AND POWER

Cities Protest Gas Rate Increases.

Boston, Mass.—Complaints are pouring into the office of the State Gas and Electric Light Commission in rapid succession against the general increase in the price of gas. Increases range from five cents to fifty cents a thousand feet and most of them already have gone into effect. In the majority of cases, complaints have been made by telephone or letter, but a formal complaint has been made by the citizens of Amesbury. The price of gas there has been increased from $1.50 per thousand cubic feet to $2. Commissioner Solomon Lewenberg declared that the complaints will be investigated as quickly as possible, but added that a formal complaint, the only kind which can be considered by the commission, requires the signature of the mayor of a city, the selectmen of a town, or the signatures of twenty citizens. The commission announced the following changes in the price of gas in the following places: Holyoke (municipal company), 90 cents to $1; Worcester, 75 cents to 85 cents; Westfield (municipal company), $1 to $1.25; Springfield, 85 cents to 90 cents; Ware, $1.50 to $1.75; Amesbury, $1.50 to $2; Cambridge, 80 cents to 90 cents; Quincy, $1.10 to $1.20; New Bedford, 80 cents to 95 cents; Malden, 90 cents to 95 cents; Revere, 90 cents to 95 cents. The New Bedford and Malden increases will not become effective until August 1. In Pittsfield, the 10 per cent. reduction for prompt payment has been reduced to 5 per cent. In all cases gas companies claim that the increased cost of coal and oil make it imperative that the price of gas be raised.

Municipal Hydro-Electric Plant.

Rochester, Minn.—Hundreds of acres of land will be covered by the reservoir to be formed by the building of Rochester's municipal dam on the Zumbro river. Much of the land is covered with timber. This will be part of the first publicly owned hydro-electric plant in the state and will generate power enough not only to supply Rochester, but several towns in the neighborhood. Its cost is estimated at $750,000. The dam will be constructed of concrete and will probably be 60 feet high.

City Awarded Sales Percentage.

Columbus, O.—The Federal Gas and Fuel Co. must pay the city of Columbus $261,485, with interest, according to a decision of the Ohio supreme court, upholding a recent judgment by Franklin county appellate court. The debt dates back to October 12, 1905, from which date the city asked an accounting for "10 per cent. of all moneys received from the sale of natural gas sold here at a price exceeding 15 cents per 1,000 cubic feet." The city's demand was based on a contract with the gas company entered into when the city granted its franchise in 1899. The gas company, fighting the suit, claimed it owed nothing at all for gas sold in parts of Columbus annexed since 1899, and also that it owed only 10 per cent. of all money received in excess of 15 cents per 1,000 for gas sold in that part of the city which was inside corporation lines in 1899. Master commissioner Robert W. McCoy, appointed to thresh out the matter, ruled the city should have 10 per cent. on the total amount collected for all gas sold, whether at 15 cents per 1,000 or more. He figured the gas company's debt at $183,670—but common pleas court pared this amount to $86,265. Appellate court later sustained McCoy's finding, and after computing interest to December 16, 1916, fixed the total of the gas company's debt to the city at $261,485. Supreme court upheld the appellate court verdict.

FIRE AND POLICE

Improving Cleveland's Fire Department.

Cleveland, O.—Council has passed an ordinance to authorize the director of public safety to expend $99,900 for the purpose of erecting buildings necessary for the fire department and the purchase or condemning of necessary land therefor, and for the purchase of motor driven fire apparatus and extending fire alarm signal system. Passage of the ordinance was recommended by the director of public safety, committee on fire, director of finance and director of law, as an emergency measure.

East St. Louis Police Board Resigns.

East St. Louis, Ill.—In response to popular demands after the recent bloody race riots, resignations of the three members of the board of police and fire commissioners were accepted by the council. A new board, consisting of Edward J. Coffee, Dr. J. F. Reid and Frederick Giessing, was appointed by mayor Mollman and approved by the council. Members of the old board who resigned were Wallace C. Watkins, Nelson A. Schein and William Schmidt. They gave as their reason that they did not care to embarrass the administration by remaining on the board after the criticism following the race riot. The citizens' committee, a branch of the Chamber of Commerce, had asked mayor Mollman to discharge the present board.

All Firemen Called Out.

San Antonio, Tex.—In one of the worst and also the most spectacular fires here in many years a four-story building occupied by a bank and a wholesale grocery and liquor warehouse was destroyed with a loss of about $225,000. The cause may never be definitely determined. It started at the rear of the building near the freight elevator shaft, and being less than a block from the central fire and police station, the firemen were soon at the scene. Apparently they were powerless to check the spread of the blaze, however. Within twenty minutes after the arrival of the first company a second alarm was sent in and every engine and piece of fire fighting apparatus available in the city was called out. Dense clouds of pungent smoke from the windows proved a big handicap in fighting the stubborn blaze. Scores of soldiers attracted to the scene served as volunteers to assist the firemen and aided in carrying the hose. Despite this the firemen made little headway against the blaze and it continued to eat its way from floor to floor. It was more than an hour and a half after the fire started before it was declared under control. The smoke proved a menace to the firemen and the soldiers volunteering to assist them. Scores were overcome temporarily and were able to return to the fight only after a rest beyond the smoke zone.

RAPID TRANSIT

Board to Study Traffic.

New York, N. Y.—The Board of Estimate and Apportionment has authorized the appointment of a traffic commission for the purpose of considering the entire problem of traffic congestion and the most efficient and economical

plans for the future development of the city's thoroughfares. This action was taken on the report of the board's committee on the City Plan on petitions asking for the appointment of a traffic commission from the Fifth Avenue Association, Street Association, City Club of New York, Murray Hill Association, Wholesale Dry Goods Center Association of New York, Broadway Association, the Merchants' Association, Advisory Council of Real Estate Interests, the Citizens' Union, Van Owners' Association, New York Furniture Warehousemen's Association, the Chamber of Commerce of the State of New York and the Central Mercantile Association. The communication of the Fifth Avenue Association referred to the success of the work of the Zoning Commission and suggested that the traffic problem be handled in much the same way, that is, by the appointment of a commission of citizens working in cooperation with the city bureaus and departments. The commission is directed to consider: (1) Traffic regulation and other means of increasing the capacity of existing streets; (2) means of separating grades at important intersections, elevated roadways for through traffic, two-level streets, street widenings and new streets; (3) a complete system of auto and trucking thoroughfares for the five boroughs, with special reference to the linking up of the boroughs and to the linking up of the city as a whole with neighboring centers in Nassau and Westchester counties and in New Jersey. The members of the commission are to serve without pay and no positions will be created or appropriations made to take care of the work of the commission. The secretary of the committee on the City Plan is secretary of the commission and Nelson P. Lewis, chief engineer of the Board of Estimate, and the borough engineers will make the necessary engineering investigations and reports. Robert H. Whitten, secretary of the Committee on the City Plan, states: "The traffic problem is now recognized as one of the most important problems connected with the physical development of the city. The enormous burden imposed upon our street facilities has increased street accidents and retarded the flow of traffic to an alarming degree. The increase in shipments and other business in the city and port of New York incident to the war will make existing traffic delays all the more intolerable. The regulations of the Police Department have been effective in relieving the growing congestion, but regulation has now gone about as far as practicable and it is now more a question of actually increasing the capacity of the roadways or of providing additional or relieving roadways."

The number of accidents occurring in the streets show a decided increase, according to a report by police commissioner Woods, who supplemented the report with a request to merchants and business houses that they carry on their transfer of cases and goods between the hours of 4 and 8 a. m., when pedestrian traffic is lightest. Boss truckmen objected to the proposal, and M. J. Cashel, president of the International Brotherhood of Teamsters, said his organization was unalterably opposed to working in such hours. The report disclosed that the greatest number of accidents happen between noon and 8 o'clock at night, the statistics indicating that sixty-three per cent take place during that period, with only twenty-four per cent happening within the safety hours recommended by Commissioner Woods. During the last six months 12,284 persons figured in street accidents as against 10,593 for the same period last year. In the last month there have been 565 more accidents than in June, 1916; automobile accidents jumped from 650 to 1,037 and motorcycle mishaps registered 60, as against 40 for June last year. The only decrease was in horse-drawn traffic accidents, which was tabulated as of June, 1916, 230; this year, 194, and in the number of persons who were injured when alighting from surface cars, this month's figures showing a decrease of three.

City's Car Receipts Share Grows.

Newark, N. J.—The Public Service Railway Company has turned over to city controller Moody a check for $199,948.65, which represents five per cent of the receipts of the company from passenger traffic within the limits of the city. A year ago the receipts of the city from the same source was $177,051.07, and the year before that $178,422.68. The gross receipts from all of the company lines operating in this city amounted to $6,776,041.50, and of this sum $3,998,973.65 was found to be taxable under the law. The check does not represent all the Public Service will have to pay to the municipality, for under the same state law by which Newark ordained that the trolley company would have to pay the five per cent on its gross receipts there is a provision that such a payment is "on account of" or "in lieu of" the five per cent requirement as apportioned to the various municipalities of the state. This means that where the Public Service's percentage does not measure up to the sum as apportioned by the state the company must make up the difference. This year it is estimated the company will have to pay about $5,000 additional. President Thomas N. McCarter, who issued a formal statement with the figures, attributes the increase over last year's figures to the business of an abnormal year as compared with a subnormal year. Mr. McCarter points out that the unusual industrial activities of the last year, as well as the abnormal travel within the city during the celebration of the city's 250th anniversary, are responsible for the increase in receipts this year. The probable effect of the jitney service on the trolley traffic is not shown in the amount turned over to the city. There is evidence, however, that the jitneys dug a hole in receipts from at least one line. In the case of the South Orange line, not materially affected by the extra demands for accommodations during the celebration, the receipts in 1916 were $668,390.61. At that time the operation of the jitneys along that thoroughfare was impeded to such an extent that not many of them ventured to make the trip, owing to poor pavement. The receipts this year amounted to $643,672.14, or a decrease of almost $25,000. Mr. McCarter pointed out that "The amount turned over to the city is equivalent to almost five points in the tax rate, for if this money was not forthcoming from the railway company for the city's uses the amount would have to be added to the sum that will be raised by taxation. When one considers this payment, together with the street paving obligations, the free service to certain city employees and other forms of indirect taxation the company must meet, it can readily be seen that we are supplying something more than transportation for the nickels we get."

To Extend Seattle Municipal Railroad.

Seattle, Wash.—City council has passed four ordinances providing for improvements to the city's street railway system. One bill authorizes the extension of one of the lines into Bullard to cost $25,000, one provides for the connection of two of the divisions by an elevated line across the south end of the city at a cost of $330,000; one for altering the system on division "A" from a double to a single wire, at a cost of $5,000, and the fourth authorizes the appropriation of $25,000 from the depreciation fund of the city lighting department as a temporary loan to the street railway bond fund. Eight new one-man cars are to be bought for $25,000.

"Memory Treatment" for Law-Violating Motorists.

Detroit, Mich.—Detroit motorists have spent over $15,000 on commissioner Couzens' "memory treatment" since last March. Since the impounding ordinance went into effect, 5,000 machines have been hauled to Cadillac square and chained, to be released only when the owners handed over the $3 impounding fee. Police at first thought that a few weeks of energetic enforcement of the ordinance would cause the drivers to remember the parking rules, but, besides finding scores of "first offenders" every day, the pound is visited at frequent intervals by some on whom the $3 punishment seems to have little effect. Six policemen, in three towing crews, and two men assigned to the pound, are kept busy all day and every day. The greatest number of cars towed to the pound in one day was 115.

MISCELLANEOUS

Cities and the Food Supply in Massachusetts.

Boston, Mass.—Out of the 354 cities and towns in the state, 325 have their local food production committee, ac-

cording to a statement from the sub committee on food supply in the state house of the general Massachusetts committee on public safety. This sub committee will doubtless continue its activity during the entire season. It is now promoting the preservation and the distribution of the food products whose raising it stimulated to the utmost during the planting season just ended. Fitchburg is one of the points of interest for the committee in view of the plan reported from there whereby there is a central canning plant for the preservation of products brought in by the raisers. It seems to the committee here quite feasible for other cities to follow the plan of having high school girls, under supervision, work at a charge of 15 cents an hour for their labor in canning whatever garden products are brought in to them. The city of Quincy has established a public city market. The food supply committee will send circulars to other cities telling about the details and trying to get them to introduce a similar system. Quincy will have a public market day on Wednesdays and Saturdays for the growers of fruit and vegetable in that vicinity. Space will be provided on tables which will be rented by the city for 20 cents a day for Wednesdays and 30 cents for Saturdays. In bad weather they can be under cover, but otherwise it will be practically an outdoor market. In addition there will be sales by the city on which a commission will be charged, varying from five cents as a minimum to 10 per cent of the selling price for the larger articles. It is expected that the commission method will be of advantage to the school children who cannot give their time to selling their products. In any case, the commission is to be charged only to those who do not rent tables, who cannot give their time and who put their stuff into the hands of the city to sell. One of the rules of the business is that there shall be no agreement among the sellers to maintain prices. In every case, the buyer and the seller are to make their own terms.

The Massachusetts Housing Experiment.

Boston, Mass.—The governor's council has approved the request of the homestead commission that it be allowed to take the first steps toward erecting homesteads in the city of Lowell at cost to citizens, and the commission desires to engage the services of Arthur C. Comey at $500 to supervise the development of the plans and the construction of the buildings. It also desires to pay Kilham & Hopkins as architects $100 per house to prepare plans for from 12 to 20 houses. For this sum the architects agree to furnish complete specifications and working drawings, to manage all details of the construction and to superintend the construction by a special agent on the ground. The council approved both requests and authorized the commission as soon as specifications are prepared to advertise for bids for the construction of the houses. The commission has in mind fourteen parcels of land in Lowell, all of which are suitable and five or six of which are desirable locations for carrying out the project. Verbal option has been secured on all the desirable parcels, but the commission does not intend to purchase any of them until the governor's council has seen and approved complete plans. The homesteads are intended for wage earners and a bill authorizing the Massachusetts homestead commission to expend $50,000 for purchasing a tract of land in this city was reported favorably by the committee on social welfare in April.

City Wins Long Smoke Abatement Suit.

Yonkers, N. Y.—The case of the city of Yonkers against the Federal Sugar Refining company in which the sugar company obtained a judgment against the city for the sum of $37,778.21 has been reversed in the court of appeals and a decision rendered dismissing the proceedings; cost in all the courts in favor of the city. This is the end of a long litigation. In August, 1907, there was a complaint made by some of the property owners who lived in and about the locality of the Federal Sugar Refining company plant that their property was being damaged and they were being annoyed by reason of the fact that the company was using soft coal and discharging soot and cinders. A resolution was passed by the common council directing the city attorney during mayor Coyne's term to institute proceedings and apply for an injunction against the Federal Sugar Refining company. Application was made to justice Morchauser and a temporary injunction was granted as against the company. Thereafter the temporary injunction was vacated and the matter sent to a referee to determine as to whether or not a nuisance was being committed. After many hearings the referee decided against the company and in favor of the city. Thereafter an appeal was taken by the company to the appellate division, who reversed the judgment of the referee and held that the city was not the proper party to bring the action. The city took an appeal to the court of appeals and the court of appeals sustained the lower court. Thereupon the Federal Sugar Refining company applied for the appointment of a referee to assess the damages that they had incurred by reason of the injunction. The matter was referred to J. Addison Young. While the case was pending before him he was elected a justice of the supreme court and had to resign as referee. An order was then made referring the matter to Charles H. Young and after numerous hearings he rendered an opinion against the city for $37,778.21. An appeal was taken by the city to the appellate division and the appellate division affirmed the report of the referee, with the exception that it reduced the amount of the damages. An appeal was again taken by the city to the court of appeals and the matter was argued in the early part of June.

Municipal Recreation Facilities of United States.

Washington, D. C.—A report under the title of "General Statistics of Cities, 1916," about to be issued by the Bureau of the Census, Department of Commerce, presents some interesting data relating to parks, playgrounds, zoological collections, swimming pools and bathing beaches and other recreation facilities in cities having more than 30,000 inhabitants. In all but two of the 213 cities covered by the report, certain areas owned by the municipalities are specifically set aside as public parks. The aggregate number of these parks, as reported for the fiscal year 1916, was 3,857, and their combined area amounted to 117,006 acres, or 183 square miles. By far the greatest number of parks, 417, was reported for Washington, D. C., but the greatest park area—7,713 acres, or about twelve square miles—is shown for New York City. Other cities with large park areas are Philadelphia, with 5,500 acres; Los Angeles, with 4,127 acres; Chicago, with 3,815 acres; Denver, with 3,719 acres; Washington, D. C., with 3,067 acres, and Minneapolis, with 3,038 acres.

The large number of parks reported by Washington, D. C., is due to the utilization by that city of triangles and other small spaces for park purposes. The numerous avenues of Washington run diagonally, as compared with the general street scheme which results in a large number of triangles. These spaces are improved, having lawns, flowers, shrubs and walks, and in many of them benches are provided. Similar areas in other cities are generally used for building purposes.

The largest single park owned by any city is Fairmount Park, in Philadelphia, which has an area of 3,526 acres, or five and a half square miles; and the next largest, a park of 3,027 acres, or more than four and a half square miles, is reported for Los Angeles.

The greatest area of parks and other public grounds inside city limits in proportion to population—one acre for each fourteen inhabitants—is shown for Quincy, Mass. (Of the total park area reported for this city, however, about 96 per cent was administered and maintained by the metropolitan park commission of the state.) Other cities reporting more than an acre to each 100 inhabitants are San Diego, Cal., with 26 inhabitants per acre of park and recreational grounds; Lacrosse, Wis., with 43; Council Bluffs, Iowa, with 45; Lynn Mass., with 52; Sioux City, Iowa, with 64; Harrisburg, Pa., with 77; Hartford, Conn., with 84; Niagara Falls, N. Y., with 87; Washington, D. C., with 97, and Covington, Ky., with 99. The states of Massachusetts and Rhode Island maintain metropolitan park systems. That of Massachusetts covers thirty-eight cities and towns, including Boston and Cambridge. The Palisades interstate park system is administered jointly by New York and New Jersey.

Zoological parks were maintained in 83 of the 213 cities covered by the report. Their aggregate collections comprised 8,125 mammals, 17,851 birds, and 829 reptiles; their buildings were valued at $5,649,582, and their zoological collections at $832,134. The greatest number of mammals, 575, was reported by Washington, D. C.

All but 18 of the 213 cities of over 30,000 inhabitants maintained playgrounds (not including those open only to school children during the school year), the total number of such playgrounds being 2,190 and their average area being a trifle more than two acres. The largest number, 185, is shown for New York, and the next largest, 160, for Philadelphia.

A total of 19 athletic fields (exclusive of those located in parks), with an average area of a little less than 8 acres, were reported by 13 cities—4 by Detroit, Mich.; 3 by Sacramento, Cal.; 2 by Hoboken, N. J., and 1 each by the remaining 10 cities.

Facilities for games and athletics in parks, playgrounds and athletic fields were maintained by 176 cities. These facilities included 3,368 tennis courts, 1,334 baseball diamonds, 331 football gridirons, 66 golf courses, and 9 polo fields.

The highest salaried superintendent of recreation, who receives $5,000 per annum, is employed by Philadelphia. Chicago reports one such official at $3,900 and one at $2,340; Baltimore, one at $3,600 and one at $1,500, and New York, Boston, Pittsburg, Newark, N. J., and Oakland, Cal., one each at $3,000.

Swimming pools and bathing beaches were provided by 111 cities whose total facilities in this respect comprised 117 outdoor swimming pools, 61 indoor swimming pools and 149 bathing beaches, at which the aggregate attendance during the year was more than 26,000,000.

Museums and art galleries were administered by 33 cities, and in 17 cities such institutions were under private administration, but received municipal aid.

The expenditures for recreation purposes (excluding outlays) in cities of over 30,000 inhabitants during the fiscal year 1916 aggregated $21,637,097, or 67 cents per capita. The greatest per capita expenditures under this head which are shown for any one city were reported by Brookline, Mass.—$4.68.

Although the report relates mainly to municipal recreation facilities, it presents a few interesting lines of information in regard to national parks and national forests, obtained from the reports and records of the Department of the Interior and the Department of Agricture, respectively.

Sixteen national parks are maintained by the Federal Government, including one in Hawaii. The others are in Arizona, Arkansas, California, Colorado, Idaho, Montana, North Dakota, Oklahoma, Oregon, South Dakota, Washington and Wyoming. Yellowstone National Park, located in Wyoming, Montana and Idaho, is by far the largest, having an area of 3,348 square miles, nearly as great as that of Rhode Island and Delaware combined. Glacier National Park, in Montana, and Yosemite National Park in California, rank second and third, respectively, in size, the area of the former being 1,534 square miles and that of the latter 1,124 square miles.

The Sequoia and General Grant national parks, in California, contain many of the famous "big trees" (sequoia gigantea), which grow to a height of 300 feet, with a diameter of thirty feet, the bark being two feet thick.

The only active volcano in the United States proper—Lassen Park—is found in Lassen Volcanic National Park, in California.

Under authority of an act of Congress passed in 1891 the President of the United States is empowered to set apart public lands bearing forests as public reservations. The primary purposes of the national forests are to insure continuous production of timber and favorable conditions as to flow of water. As means to these ends, strict supervision is maintained over the sale of mature timber and the forest areas are guarded against fire.

These areas are much used by campers, hunters and fishermen. "Recreation maps" are issued, which not only present maps of many of the national forests, showing towns, streams, roads and trails, but contain information pertaining to camp sites, fish and game; and campers' registers are kept at the headquarters of the forest supervisors.

The national forests, 153 in number, are scattered over nineteen states, Alaska and Porto Rico. All but two of these states—Florida and Michigan—lie west of the Mississippi. The total area of national forest land (excluding that of other lands within national forest boundaries) is 244,189 square miles. This area is nearly as great as that of the states of Texas; or of New England, New York, Pennsylvania, New Jersey, Delaware, Maryland, District of Columbia, Virginia and West Virginia combined; or of Ohio, Indina, Illinois, Michigan and Wisconsin combined.

Committees Propose Municipal Food Utilities.

Spokane, Wash.—A municipal abattoir, a municipal ice plant, another public market with cold storage facilities and a municipal cold storage plant are included in the program laid out for Spokane by two committees of the mayor's price investigation commission. The majority report of the ice committee recommends the ice plant; the cold storage public markets and packing houses committee wants the new market, the abattoir and the cold storage plants. Majority report of the ice committee of the mayor's price probing commission says: "The real reason, in our opinion, for this increase (in the price of ice) is the fact that one company has, by suppressing competition, secured a substantial monopoly of the supply and arbitrarily increased the price. The city does not have the authority to regulate the prices charged for this commodity (ice). It does not have the power to install a municipal ice plant and we therefore recommend that the city purchase and conduct such a plant." The claim of local companies that increased cost of production justifies the increase is not justified, says the probers. "We examined the books of the companies," they say, "but were unable to verify their statements as to the losses sustained during 1916, because the books and accounts were kept in such a manner as to render an inspection of no value or aid to the committee. It is true that the price of feed and labor has increased, but the Mowbray Pearson Company is, despite these facts, selling at 1916 prices and presumably making a reasonable profit. The experience of this company refutes the claim of those companies that have increased the price." Cost and production data gathered by the committee show that the city uses about 25,000 tons of ice each year and that about 3,000 families in the city use ice. Says the report: "The supply of natural ice is unlimited, but because of shrinkage in transportation it is not as economical as artificial ice, neither is it as sanitary. The cost of manufacturing ice varies from $1.12 to $1.50 a ton."

Federal action is the only hope for relief from abnormal prices for foodstuffs caused by combinations for manipulating markets and cold storage plants. Local action looking toward a relief from the present situation not only would be a duplication of effort and energy, but, because of its limited scope, practicaly worthless. This is the gist of a final report by Mrs. J. M. Simpson, W. H. Farnham and Al Germain, the packing houses, public markets and cold storage committee of the price probing commission. The report continues: "We would recommend that if within a reasonable time relief is not obtained through federal, or even state action, the proper municipal authorities take active steps to establish an abattoir and cold storage plant of sufficient capacity to insure our citizens a reasonable supply of meats and such other necessities as would be properly handled by such plants." Regarding public markets the committee says: "This committee has very thoroughly gone into the question of public markets generally and the desirability of a municipal market or markets in this city. To a questionnaire sent out to the mayors of 33 cities we received 25 answers, and in all but five, successful public markets are being maintained. We are unanimously of the opinion that municipal public markets are a success and that after the initial cost of installation a centrally located market should be self-supporting. It would tend in a great measure to largely reduce the cost of farm products to the consumer and would give the producer a better price for his produce." The increase in the price of food and clothing in Spokane is "due to abnormal demand caused by the war, shortage of crop and speculation. Speculation in food and land must be eliminated." So say the probers appointed by the mayor to investigate the rise in food and clothing prices in the city. The report was formally filed with W. F. Worcester, secretary of the commission of fifteen. Control of prices is a national problem, in the opinion of the committee, and little can be done locally.

Testing of Gasoline Pumps.

Trenton, N. J.—A ruling was recently announced by state superintendent of weights and measures Frank Wanser. An order has been promulgated by his department which requires that dealers using automatic devices for the sale of gasoline, must make tests of these machines each day before the first sale and also before commencing to use a new supply of liquid, so that the accuracy of the device may be assured. For the purpose of the testing, standard liquid measures of one-gallon and five-gallon capacities are to be used. Superintendent Wanser points out that it is to the interest of the dealer as much as the consumer that these tests be made, as it has frequently been demonstrated that these liquid pumps are likely to show discrepancies to the detriment of the dealer, as they have been known to have delivered more than the required quantity. Each motorist is also advised by the state superintendent to see that the hose from the measuring tank is not removed from the tank in the automobile until all the liquid has been removed from it.

LEGAL NEWS

A Summary and Notes of Recent Decisions—Rulings of Interest to Municipalities

Right to Open Alley—Compensation for Closing.

(Tex. Civ. App.) Where lot owners, purchasing by plat dedicating an alley, had a special right in having the alley left open, the city could not destroy it without making itself liable for compensation.—Bowers v. Machir, 191 S. W. 758.

Assessments—Block System.

(N. Y. Sup.) The block by block system in making assessments in street opening proceedings is proper, and should be applied save in exceptional cases.—In re Second and Third Sts. in Borough of Queens, 163 N. Y. S. 521.

Certification of Bill—Lack of Funds.

(N. Y. Sup.) Want of funds of a municipality to purchase fire apparatus is a defense, to be alleged and proved, in an action to compel certification of the bill for such apparatus, and failure to allege cuts off the defense.—People ex rel. Mulholland Co. v. Nowak, 163 N. Y. S. 174.

Contracting Powers of Cities.

(Mo. App.) Rev. St. 1909, § 2778, restricting the contracting powers of cities of the fourth class, is intended for the protection of the city, and not for the protection of those who become obligated to the city.—City of Weston v. Bank of Greene County, 192 S. W. 126.

Change of Grade—Assessments.

(Wash.) Where a municipality, having been awarded judgment against a county for cost of changing grade necessitated by a county improvement, failed to change the grade, and was absorbed by an adjacent city, such city could not assess for benefit for changing the grade, since it was liable for obligations of the first city and bound by the judgment.—In re Shilshole Ave., 162 P. 1010.

Police Power—Constitutionality—Private Rights.

(U. S. D. C.) An ordinance, to be valid under the police power, must have some relation to one or more of the objects of such power, must not conflict with state or federal Constitution, or statutes, and must not arbitrarily, unnecessarily, or unreasonably invade private rights.—Chicago, M. & St. P. Ry. Co. v. City of Minneapolis, 238 F. 384.

Liability for Offensive Operation of Sewage Disposal Plant.

(Md.) A municipal corporation is liable to a property owner specially damaged by the construction and operation of a sewage disposal plant which caused such offensive odors as to be a nuisance, though there was no negligence, and the city had ample statutory authority.—Taylor v. City of Baltimore, 99 A. 900.

Payment of Contracts—Indebtedness.

(Mont.) Whether a city in entering upon a contract for a filtration plant incurred an indebtedness depends upon the state of its finances, and if it has on hand sufficient available funds to pay contracts as they fall due, it is a cash transaction, and no indebtedness is contracted.—McClintock v. City of Great Falls, 163 P. 99.

Authorization of Bonds—Amounts of Issues.

(Md.) An act (Laws 1916, c. 94) authorizing a municipal corporation to borrow and issue bonds to extent of $100,000 for purpose of a water and sewerage system, held to authorize an issue in two series of $50,000 each, one for water, and other for sewerage.—Seyboldt v. Town of Mt. Rainier, 99 A. 960.

Insufficient Petition—Ability of Contractor to Recover.

(Kan.) Where city upon insufficient petition of abutting owners let paving contract, and in taxpayers' suit under Civ. Code, § 265 (Gen. St. 1915, § 7163), was enjoined from levying assessments, contractor, knowing of pendency of suit before commencing work, though no temporary injunction issued, could not recover on contract, nor for less of profits or damages.—John Ritchie & Sons v. City of Wichita, 163 P. 176.

Protection of Municipality from Liability.

(Cal.) Under common law municipality is protected from liability only while exercising delegated functions of sovereignty.—Chafor v. City of Long Beach, 163 P. 670.

Change in Grade—Liability.

(Wis.) Where change of grade is made by authority of law and with due care, municipality making change is not liable for consequential injury to abutting lots, unless expressly made so by statute or Constitution.—Henry v. City of La Crosse, 162 N. W. 174.

Governmental Duty—Garbage Collection.

(Tenn.) Collection of garbage is a governmental duty for which a municipal corporation is not rendered liable by its employes' negligence provided no nuisance is committed.—City of Nashville v. Mason, 192 S. W. 915.

Duty to Keep Open Streets.

(Iowa) A municipal corporation must keep streets open to public travel free from obstructions interfering with ordinary public travel, including automobile traffic, under Code, § 753, placing the duty of street repairs, etc., upon municipalities.—Wolford v. City of Grinnell, 161 N. W. 686.

Lowest Bidder—One Bidder.

(N. J. Sup.) The statute (Act April 15, 1911 [P. L. p. 224] § 2) requiring a town to award a contract to the lowest municipal bidder, does not prevent the award of a contract where there was only one bidder.—Bauer v. Town of West Hoboken, 100 A. 223.

Water Supply—Liability of Municipality.

(Me.) A municipal corporation engaged in the business of supplying water to its inhabitants is engaged in an undertaking of a private nature, and is liable therein for breach of contract or for negligence as a private corporation would be.—Woodward v. Livermore Falls Water Dist., 100 A. 317.

Extra Work on Sewer—Recovery.

(Mich.) Where sewer construction contract required the order of the board of public works for extra work to be in writing, contractor could not recover for extra work and material except by obtaining such written order.—Schneider v. City of Ann Arbor, 162 N. Y. 110.

Police Power—Size and Position of Billboards.

(R. I.) Pub. Laws 1910, c. 542, and Providence Ordinance, c. 443, enacted in pursuance thereof, regulating size and position of billboards, are a valid exercise of police power and constitutional.—Gilmartin v. Standish-Barnes Co., 100 A. 394.

Garbage Dump—Nuisance—Liability.

(Tenn.) A garbage dump, upon which large quantities of material were burned during a high wind, constituted a nuisance rendering the municipality liable, where the fire communicated itself to plaintiff's property.—City of Nashville v. Mason, 192 S. W. 915.

Sewer System—Description.

(Ill.) An ordinance for sewer construction describing it as within a village is sufficient to cover an improvement originating within the village but to secure proper pitch carried without the village to empty into a river.—Village of Bradley v. New York Cent. R. Co., 115 N. E. 640.

Letting to Lowest Bidder—When Inapplicable.

(Wis.) A city charter requirement, that contracts for "work" should be let to the lowest bidder, is inapplicable to a street lighting contract, especially since the rate charged is constantly subject to the Railroad Commission's supervision under Public Utilities Law.—State v. Oconto Electric Co., 161 N. W. 789.

Debt Limiting Municipal Indebtedness.

(Ga.) City of Waycross under new charter (Acts 1909, p. 1456) having made valid assessments against abutting lots for cost of paving street and levied ad valorem tax to cover balance and cost, its contract liability for pavement during current year, did not amount to debt, within Const. art. 7, § 7, par. 1 (Civ. Code 1910, § 6563), limiting municipal indebtedness.—City of Waycross v. Tomberlin, 91 S. E. 560.

NEWS OF THE SOCIETIES

Calendar of Meetings.

July 24-27.—DOMINION ASSOCIATION OF FIRE CHIEFS. Annual convention, Port Arthur and Fort William, Ont. Secretary, James Armstrong, Chief, Fire Department, Kingston, Ont.

July 30-Aug. 3.—SOUTHERN SOCIOLOGICAL CONGRESS. Annual meeting, Blue Ridge, N. C. Secretary, J. E. McCulloch, 508 McLachlen Bldg., Washington, D. C.

Aug. 1-3.—AMERICAN SOCIETY OF SANITARY ENGINEERING. Annual meeting, Grand Rapids, Mich. President, William C. Groeninger, Ohio State Board of Health, Columbus, O.

Aug. 6.—PACIFIC COAST ASSOCIATION OF FIRE CHIEFS. Twenty-fifth convention, Anaconda, Mont. Secretary, ex-Chief H. W. Bringhurst, Seattle, Wash.

Aug. 15-17.—LEAGUE OF WISCONSIN MUNICIPALITIES. Annual convention, Racine, Wis. Secretary, Ford H. MacGregor, Madison, Wis.

Aug. 21-23.—NEW YORK STATE FIREMEN'S CONVENTION, Flushing, N. Y. Secretary, Thos. Honohan, Frankfort, N. Y.

Aug. 22.—UNION OF NEW BRUNSWICK MUNICIPALITIES. Annual convention, St. John, N. B. Secretary, James King Kelley, St. John.

Aug. 27-29.—UNION OF CANADIAN MUNICIPALITIES. Annual convention, London, Ont. Secretary, W. D. Lighthall, K.C., Westmount, Que.

Aug. 29-31.—UNION OF NOVA SCOTIA MUNICIPALITIES. Annual convention, Truro, N. S. Secretary, Arthur Roberts, Bridgewater, N. S.

Aug. 29-31.—ONTARIO MUNICIPAL ASSOCIATION. Annual convention, Toronto, Ont. Secretary, B. H. Spence, 705 Lumsden building, Toronto, Ont.

Sept. 5-8.—LEAGUE OF AMERICAN MUNICIPALITIES. Annual convention, Gary, Ind. Secretary, Robert E. Lee, City Hall, Baltimore, Md.

Sept. 10-15.—NATIONAL EXPOSITION OF SAFETY AND SANITATION. Annual conference, New York, N. Y. Secretary, W. C. Cameron, Continental and Commercial Bank building, Chicago, Ill.

Sept. 11-13.—AMERICAN ASSOCIATION OF PARK SUPERINTENDENTS. Annual convention, St. Louis, Mo. Secretary, Roland W. Cotterill, 533 City Hall, Seattle, Wash.

Sept. 11-14.—NEW ENGLAND WATER-WORKS ASSOCIATION. Annual convention, Hartford, Conn. Secretary, Willard Kent, 715 Tremont Temple, Boston, Mass.

Sept. 18-20.—LEAGUE OF VIRGINIA MUNICIPALITIES. Annual convention, Lynchburg, Va. Secretary, L. C. Brinson, Portsmouth, Va.

Sept. 24-29.—LEAGUE OF CALIFORNIA MUNICIPALITIES. Annual convention, Santa Rosa, Cal. Secretary, Wm. J. Locke, Pacific Building, San Francisco, Cal.

Sept. 25-27.—SMOKE PREVENTION ASSOCIATION. Annual convention, Columbus, O. Secretary, Frank A. Chambers, City Hall, Chicago, Ill.

Sept. 27-29.—AMERICAN AND CANADIAN ENGINEERS AND ARCHITECTS OF NORWEGIAN BIRTH OR DESCENT. Informal congress and re-union, Chicago Norske Klub, Chicago, Ill. Chairman, Committee on Arrangements, Joachim G. Glaver, consulting engineer, Chicago, Ill.

Oct. 15-17.—NATIONAL HOUSING ASSOCIATION. Annual conference, Hotel La Salle, Chicago, Ill. Secretary, Lawrence Veiller, 105 East 22d St., New York City.

Oct. 17-18.—LEAGUE OF MINNESOTA MUNICIPALITIES. Fifth annual convention, St. Cloud, Minn. Secretary-treasurer, Richard R. Price, University of Minnesota, Minneapolis.

Oct. 22-24.—AMERICAN CIVIC ASSOCIATION. Annual meeting, St. Louis, Mo. Secretary, Richard B. Watrous, 914 Union Trust building, Washington, D. C.

Nov. 19-24.—CITY MANAGERS' ASSOCIATION. Annual meeting, Detroit, Mich. Secretary, W. L. Miller, City Manager, St. Augustine, Fla.

Nov. 20-23.—PLAYGROUND AND RECREATION ASSOCIATION OF AMERICA. Recreation Congress, Milwaukee, Wis. Secretary, H. S. Braucher, 1 Madison Ave., New York, N. Y.

Nov. 21-24.—NATIONAL MUNICIPAL LEAGUE. Twenty-third annual meeting, Hotel Statler, Detroit, Mich. Secretary, Clinton Rogers Woodruff, 703 North American Bldg., Philadelphia, Pa.

League of American Municipalities.

Members of the League of American Municipalities are being asked by its president, mayor Buehrman, of New Orleans, and its secretary, R. E. Lee, of Baltimore, in regard to omitting the 1917 convention. Such action already has been taken by the American Society of Municipal Improvements, which was to mave met at New Orleans in November.

Iowa League of Municipalities.

The 1917 meeting of the Iowa State League of Municipalities will be held in Iowa City in the early part of September.

Empire State Gas and Electric Association.

The second meeting of this association was held at the Iroquois Hotel, Buffalo, N. Y., July 13. The principal subjects discussed were "Power House Organization," "Hours of Labor" and "Wages and Bonuses."

Pennsylvania County Commissioners.

At the annual convention held at Pottsville, the following officers were elected: President, W. D. Reamer, Westmoreland; vice-president, John D. Jenkins, of York; second vice-president, W. C. Kraemer, Erie; secretary, Addison White, Warren; treasurer, William McElwee, Jr., Lawrence. Pittsburgh and Newcastle were candidates for the place of meeting for the next convention. Pittsburgh received 143 votes to 65 for Newcastle.

Indiana Firemen's Association.

Indianapolis was selected as the city in which the first annual convention of the Indiana Firemen's Association will be held, August 3 and 4. This decision was reached at a meeting of the board of directors of the organization, held at Indianapolis recently.

Delegates from all parts of the state will attend the convention which will be held in the Chamber of Commerce building. The association was organized last March, and is represented in twenty-seven cities. Two delegates from each city will attend and many other members of fire deartments, including fire chiefs, will be present.

Among the questions to be discussed at the state meeting will be fire prevention, standard equipment and the firemen's pension.

Chicago Cement Machinery and Building Equipment Show.

The first Chicago Cement Machinery and Building Material Show will be held at the Coliseum, opening at eight p. m. Wednesday, Feb. 6th, and closing Feb. 13. This show, held under the management of the National Exhibition Company, will take the place of the annual cement shows which have been held in the Coliseum for the past ten years. The Cement Products Exhibition Company will conduct no cement show in the Coliseum in 1918.

Efforts will be made to bring to Chicago during the period of the show such organizations as the American Concrete Institute, the American Concrete Pipe Association, the National Builders' Supply Association, the Illinois Lumber and Builders' Supply Dealers' Association, the American Association of Engineers, etc.

Prices for space at the coming show are the same as those which prevail at the last cement show. These prices include all necessary booth equipment and are payable in two installments. A new plan of assigning space will be instituted, preference being given to the exhibitors at the tenth show. Adequate space for heavy machinery will be provided.

PERSONALS

Crane, Frank B., has been appointed superintendent of supplies of Boston, Mass.

Dater, Philip H., city engineer of Portland, Ore., has resigned. He will be succeeded by O. Laurgaard.

Hartigan, Joseph, commissioner of the bureau of weights and measures, of New York city, has resigned, to take effect on August 1. Mr. Hartigan will resume the practice of law, which he gave up upon his appointment in May 1914.

Moore, William S., city engineer of Grand Rapids, has just been appointed State Highway Engineer of Indiana.

Reimer, A. A., engineer of the East Orange, N. J., water commission, has been dropped by the commission. Mr. Reimer is acting as captain in the Engineers' Reserve Corps and the commission contends that an engineer should be on hand in case of emergency. R. M. Roper, assistant engineer, is acting head of the department.

Schober, F. Carl, city forester of Syracuse, has resigned and will go to Baltimore as forester for that city on August 1.

Stanley, G. C., has been appointed chief of the Norfolk, Va., fire department, to succeed W. L. Sykes.

Steele, A. G., a paymaster in the Pennsylvania highway department, has resigned to take a position with the state treasury.

Winsor, Frank E., has been reappointed chief engineer of the Providence Water Supply Board. His salary will be $10,000 a year.

NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

PIVOT LOCK MANHOLE COVER.

For Street Sweeping Receptacles and Other Services.

The Ransehousen pivot lock cover, ist put out on the market, is designed o fill the need for a more reliable type f manhole cover than is commonly sed. The device consists of a locking nd operating mechanism which is ap- licable generally to all street and side- valk cover plates in service in street, treet cleaning, sewer, water and light epartments and telephone, telegraph, as and other public utilities. It is also seful for coal-hole covers. It is de- igned to eliminate the troublesome eatures of the ordinary gravity seated overs.

The working parts of the cover are imple, compact and only three in num- er. They are enclosed in a moisture nd dirt-proof housing and packed in rease, thus eliminating difficulties due o rusting, freezing or adhesion. The iechanism is operated by a key wrench aving a "T" handle about three feet ng. To open, the key is inserted in a ot in the cover near its edge. A ounter-clockwise turn of the key rench releases the lock and raises ie cover perpendicularly from its rim r clearance and then rotates or piv- ts the cover horizontally away from ie frame and exposes the opening. To ose, a clockwise turn of the key rench swings the cover back over its at and automatically lowers and locks to its seat. It can be so designed iat the key wrench may not be re- ioved until the cover is positively ated and locked. The lifting power applied from the under side of the over and no ice or rust can resist its plication.

The cover is positively locked to its ame when seated; it can not be un- ated or tipped by passage of vehicles id it can only be opened by the key rench in the hands of an authorized rson. Carelessness of an operator is feguarded against by the key wrench ing positioned in mechanism until e cover is locked. This safety fea- re eliminates the frequent liability of damage suits and makes the cover fool-proof and burglar-proof.

Another important advantage claim- ed for the cover is economy of time and labor in opening. One person can quickly unlock and operate the device under any condition of weather or tem- perature.

A particularly important application of the new type of cover, which is in- teresting street cleaning officials, and which promises a solution to many dif- ficulties, is the use of subsurface re- ceptacles to hold cleaners' cans. This method has recently been favorably considered in the cities of Springfield and Worcester, Mass.

The accompanying illustration shows the device. It is made by the East Iron & Machine Co., Lima, O.

STEEL CASTINGS.

For Heavy Service Made by Special Stroh Hardening Process.

The use of machinery of all kinds in construction work and in utilities plants frequently involves the scrap- ping of parts and even whole machines because of excessive wear on only a very small, though essential, part of the metal. Such is perhaps most often the case with such parts as pinions, gears, wheels and jaw mem- bers in crushing machinery. The actual percentage of the weight of a steel casting which is worn away in practice is generally very small. For example, the teeth of the average gear constitute less than ten per cent of the total weight; a worn tooth weighs half as much as a new—and the re- mainder, or 95 per cent has been used merely for supporting weight or stress and is never worn out. The use of hard material is of no benefit in this greater portion and is nearly always detrimental, both on account of the expense of machinery : nd the nature of high carbon or high alloy steel.

The solution of this problem is claimed by the Stroh steel hardening process. It puts Stroh alloy, held to be the greatest wear resistant steel known, only on the parts subject to actual abrasion. The easily machined and cheaper material is used in the other 95%, thus cutting down expense. The Stroh process is a method for casting the finest alloy steel together with ordinary soft steel in one solid piece. The resultant casting has a wear-proof alloy steel stratum upon the wearing surfaces, while the body is composed of any desired steel and is in no way affected. This alloy can neither come loose, nor spall, nor spread and flow. Its depth or thick- ness, its location and its hardness are completely controlled and are varied according to the size of the piece and nature of service expected.

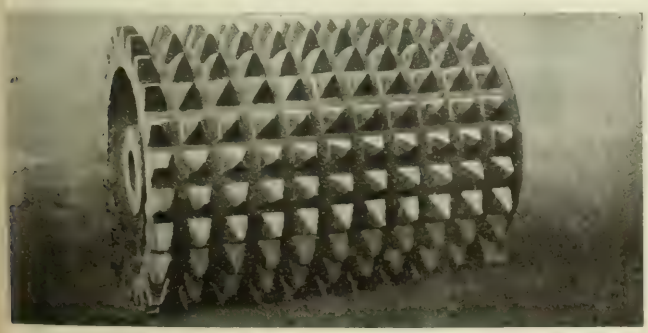
RANSEHOUSEN PIVOT LOCK MANHOLE COVER.

The manufacture of these castings naturally requires careful control and specially skilled labor. These are claimed to be the chief features of the Lawrence and Darlington foundries, where the Stroh process castings are made. The foundries turn out carbon steel, titainum, vanadium, nickel or manganese steel castings. The typical casting generally has a base of or- dinary carbon steel, the others being made on specifications.

These castings are widely used in crushing machinery, the Blake jaw crusher, in fact, having been first made at the Lawrence foundry.

One of the accompanying illustra- tions shows some gyratory crusher heads. Stroh castings are used for heads and plates and have been found very satisfactory. The Stroh steel concave plates do not peen over or flow and bend. Removal or resetting of worn Stroh steel plates is as easy as of iron. The other cut illustrates the use of Stroh steel in slugger roll castings.

Stroh process castings are the pro- ducts of the foundries of the Stroh Steel Hardening Process Co., First National Bank building, Pittsburgh, Pa.



STROH STEEL SLUGGER ROLL.

INDUSTRIAL NEWS

Cast Iron Pipe.—Prices continue at the record high levels of last week. While private buying continues to a slight extent, municipal business is still withheld. Quotations: Chicago—4-inch, class B and heavier, $68.50; 6-inch, $65.50. New York—4-inch, class B and heavier, $68.50; 6-inch, $65.50. Birmingham—4-inch, class B and heavier, $63; 6-inch, $60; class A, $1 extra.

The San Francisco office of the **Blaw-Knox Co.**, a consolidation of the Blaw Steel Construction Co. and the Knox Pressed & Welded Steel Co., will be maintained in the Rialto building and in charge of Edward Ornitz.

The Pacific Flush Tank Co., Singer building, New York, and 4241 E. Ravenswood ave., Chicago, has just published a new circular describing the use of sewage ejectors in industrial works. This catalog should prove of decided interest and value at the present time of industrial expansion. The type of ejector described is the "PFT" and its construction and operation are fully explained and clearly illustrated.

War Contracts for Motor Trucks.—The Transportation Division of the War Department announces the letting of contracts for the following motor trucks:

Make	Number of Trucks	Classification
Packard	1,800	B
Locomobile	400	B
Clinton	3,750	B
Pierce Arrow	800	A
Jeffery	3,000	A
Garford	900	A

The plant of the **United States Motor Truck Co.**, at Cincinnati, O., was recently the scene of a meeting of about a hundred manufacturers and dealers in motor trucks in the Cincinnati district at a lecture on truck springs and axles given by J. R. Phillips, service manager of the Sheldon Spring & Axle Co., Wilkes-Barre, Pa. The design and construction of worm drive truck axles and of methods of taking care of them after they have been put into service, were explained. Luncheon was served by the company to its guests. Similar lectures will be given in future.

Preparedness Inventory of Automotive Plants.—A comprehensive industrial inventory of the automotive industries, including automobile, airplane and watercraft factories, to make available to the Government all possible information regarding the manufacturing facilities and the possibilities of expansion for war work, has been inaugurated by the Automotive Committee of the Council of National Defense. The work will probably require at least three weeks. The committee states that the undertaking was inspired by the approaching great demand on the industries for airplane engines, motor trucks, tractors and motor boats for war purposes.

Proposed Power Plant in Australia.—The city of Melbourne, Australia, has been discussing the possibility of building a power plant that would utilize pulverized coal or lignite for fuel. It is possible that experts from Australia will visit the United States to investigate plants in use in this country. American firms interested and wishing to keep in touch with this project should correspond directly with the city electrical engineer of Melbourne, Mr. H. R. Harper.

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

SEWERS and a DISPOSAL PLANT are to be built by Grand Mound, Ia., from plans worked out by Chas. P. Chase, Clinton, Ia.

Tehamah, Neb., is to build a BRIDGE according to plans drawn by A. C. Arend, Brandies building, Omaha, Neb.

In making a number of SEWER IMPROVEMENTS, Taylor, Pa., had the engineering services of Harry C. Hall, Mears building, Scranton, Pa.

The city of Bay St. Louis, Mo., has voted $200,000 for the construction of a reinforced concrete SEA WALL. The engineer for the project is D. U. Harris, Mobile, Ala.

Frankfort, N. Y., is to make a number of PAVING IMPROVEMENTS. The engineers are Woodward & Symonds, Utica City National Bank building, Utica, N. Y.

A SEWAGE TREATMENT PLANT is to be built by Waxahachie, Tex. Plans and specifications were prepared by M. Griffin O'Neil & Sons, consulting engineers, 1505-8 Praetorian building, Dallas, Tex.

The WATERWORKS of Liberal, Kans., will be improved according to the plans and specifications being prepared by E. T. Archer & Co., 609 New England building, Kansas City, Mo.

Hamilton County, Columbus, O., is to build a CONCRETE BRIDGE. The plans for the structure were prepared by W. J. Watson Engineering Co., 1150 Leader building, Cleveland, O.

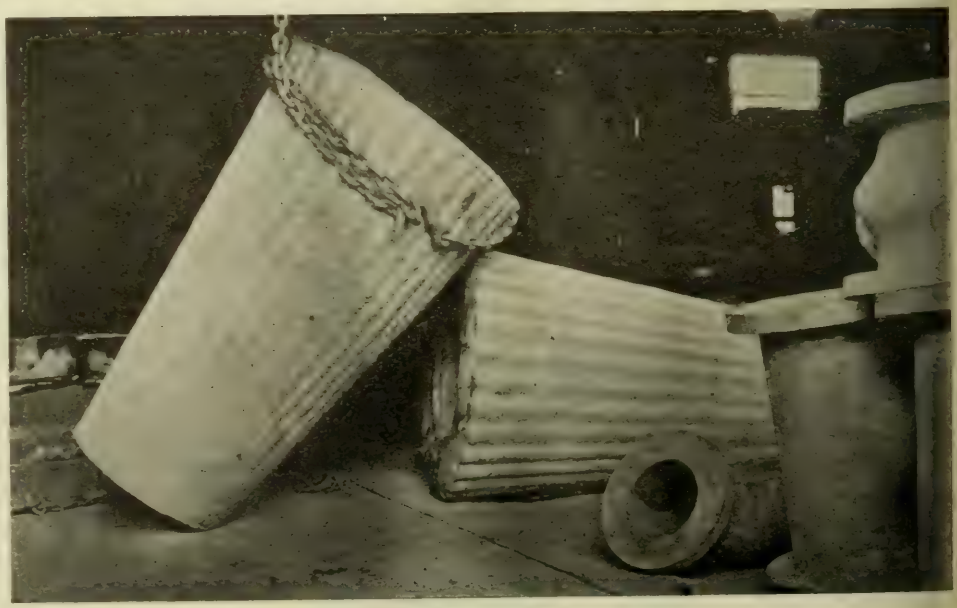
Eufaula, Okla., is to make STREET IMPROVEMENTS. The plans and specifications were prepared by the Hughes Engineering Co., 304 Bank of Commerce building, Tulsa, Okla.

PAVING IMPROVEMENTS are to be made by Boyd County, Catlettsburg, Ky., plans having been completed by F. W. Gesling, Ashland, Ky.

SEWERAGE and PAVING IMPROVEMENTS are to be made by McKeesport, Pa. The engineer to prepare plans and specifications is Cyrus E. Miller, 5135 Jenkins Arcade, Pittsburgh, Pa.

An ELECTRIC LIGHT PLANT and SEWERS are being considered by Sentinel, Okla. The engineers are W. B. Rollins & Co., 209 Railway Exchange Building, Kansas City, Mo.

The Green Bay Levee & Drainage District No. 2, Fort Madison, Ia., is to build a PUMPING STATION. Plans and specifications were prepared by the Edmund T. Perkins Engineering Co., 1210 First National Bank building, Chicago, Ill.



STROH STEEL GYRATORY CRUSHER HEADS.

Municipal Journal

Volume XLIII NEW YORK, AUGUST 2, 1917 No. 5

CONSTRUCTION WORK ON DU PONT ROAD

Stone and Sand Delivered in Measuring Boxes by Industrial Railway Direct from Railroad to Mixer, Eliminating Wheelbarrow Work—No Expansion Joints Provided—Fresh Concrete Protected by Screens.

The following description of the construction of a section of the DuPont road in Delaware is of interest, not only because of the methods employed by the contractor, but also on account of the fact that this road represents the latest principles of design and construction for concrete highways. The section described includes a ten-mile stretch extending from Georgetown to a mile north of Ellendale. The over-all width is 24 feet. The concrete pavement is 14 feet wide, 5 inches thick on the edges and 7 inches in the center.

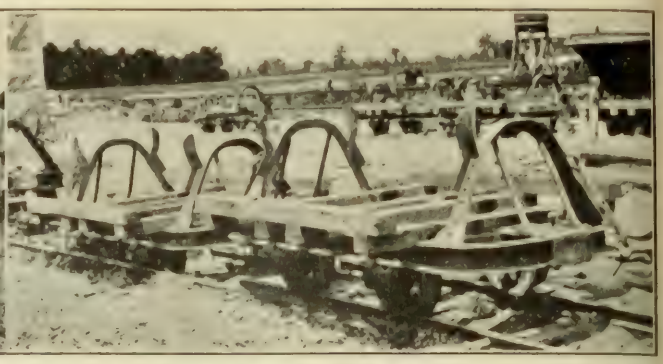
All the heavier excavation was finished last fall and winter, so that the only work of this sort now going on is fine grading, which is carried on just ahead of the mixing and laying work. The country is very level, and even on the heaviest grading most of the earth moving was done by hand, as cuts and fills were not deep enough to make the use of machinery economical. On one stretch a steam shovel was used, and in clearing and grubbing through Ellendale swamp, a distance of about two miles, stump pullers and explosives were used freely. The flat character of the country and the numerous drainage ditches made necessary a complete drainage survey, which included every ditch and water course within a mile of the road. This not only provided data for securing very good drainage, but also was economical, as a great many drainage courses were either diverted or consolidated.

The number of men employed on the fine-grading gang varied from 6 to 12, depending on the amount and kind of work to be done. Usually it was necessary to take only three or four inches off the surface and to shape the road, after which a 6-ton tandem steam roller was used to compact the sub-grade.

All materials are delivered by rail to unloading

CONCRETE MIXER AND GANG AT WORK, DU PONT ROAD

CARS CARRYING BOXES OF AGGREGATE.



CARS WITH BOXES REMOVED.

switches installed at stations most convenient for the contractor. The first location, at Ellendale, served the northern section of the road, while the present location at Redden is convenient for the remainder of the work. From the railway, all materials are delivered to the road by Koppel equipment.

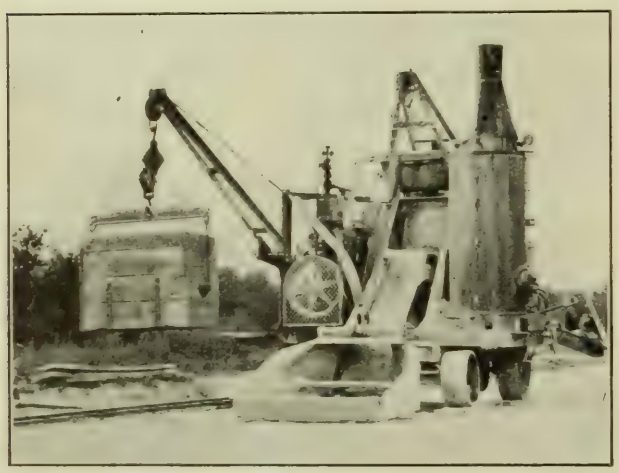
Sand and stone from the cars are loaded by shovelers directly into wooden boxes mounted on the Koppel cars. The side-dump bodies regularly furnished with these cars were removed and a frame of 2x4 timbers was placed on the chassis of the car. On this frame were mounted two wooden boxes, each having a capacity of 18 cubic feet. These boxes, as shown in the illustrations, are rectangular in shape and on each end have a cast iron trunnion by which they may be raised or handled.

A stock pile is maintained at the unloading station in order to provide a supply of materials in case of delay in securing the regular daily supply of sand, stone or cement. Except when necessary to draw from this pile, all materials are shoveled directly into the boxes. In the case of sand and stone, a bifurcated chute is used. the wide end being hung on the car with a leg discharging into each of the two boxes placed on the Koppel car. These boxes are filled with stone to a mark indicating that they contain 12 cubic feet each. The remaining space, 6 cubic feet, is filled with sand.

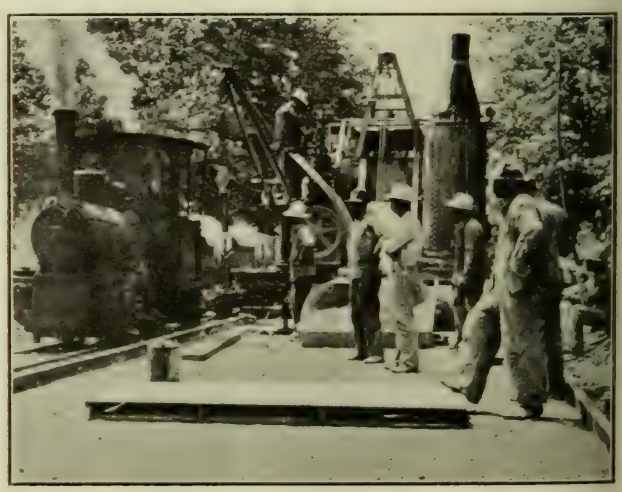
At the mixer a crane attached to the mixer raises the boxes one at a time and dumps them into the charging scoop, into which three bags of cement are then placed. The empty boxes are replaced on the cars and these cars are pushed forward to make way for other cars carrying filled boxes. A 1½-minute mix is prescribed, which makes the rate of charging the scoop about once in two minutes. This allows plenty of time to move the cars and operate the same, which is done by hand. This method removes the necessity of dumping the stone and sand on the sub-grade and then shoveling it into wheel barrows or other devices for transmitting it to the mixer. By means of it, the mixing and placing gang is reduced to 18 men employed as follows: Four men placing concrete; 2 men on the cutting template; 1 engineer; 1 fireman; 2 finishers; 2 men on the form; 1 man operating the crane; 3 men feeding cement and helping the crane man; and a foreman. The two finishers use a belt instead of a float to secure the required finish. The cutting template is made of a 4x8-inch angle iron, bent to proper crown with the 8-inch side next to the concrete. Working under average conditions, the above gang can lay about 600 feet of road a day.

Transverse joints are placed only at the end of each day's work, the longest stretch to date without a joint being about 585 feet. The main joint is made by placing in between the side forms and perpendicular to the center line of the road an inch board cut to the true cross section of the road. Five slots are spaced along this board, allowing five ⅞-inch rods 3 feet long to be placed so that 18 inches are covered by concrete and 18 inches project. The concrete is struck off at this board and the next day the board is removed and the new concrete bonds with the old by means of these rods. The bond is strengthened by 2-inch bends placed at each end of each rod. No filler is used on this joint. The regular Kahn filler joint is used for an emergency joint during construction, as the joint board can not be removed until the initial set of the concrete or for a longer period. The cement used is Saylor's portland, with which "Limoid" is mixed.

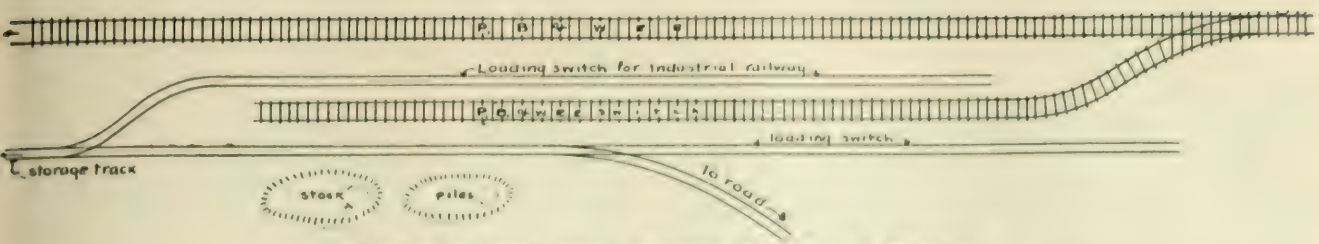
The main factor in reducing the size of the crew at the mixer is the method of handling the industrial cars.



MIXER HANDLING 18-CUBIC FOOT BOX OF STONE AND SAND.

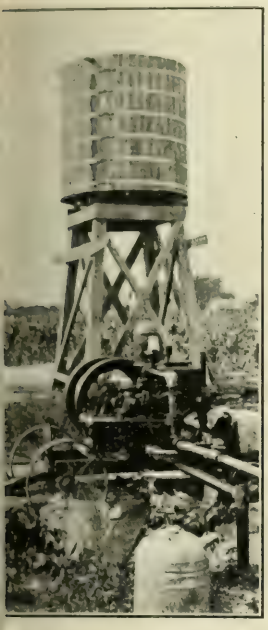


MIXER AND INDUSTRIAL TRAM; PLATFORM FOR STORING CEMENT IN FOREGROUND.



LAYOUT AT UNLOADING SWITCH AT REDDEN STATION

The Koppel equipment included 20,000 feet of 24-inch, 20-pound standard track, 50 cars and one locomotive. All these cars are employed on hauling material. Equipped with wooden boxes, as described before, they are divided into three 16-car trains, each train being made up of two cement cars and fourteen sand and stone cars. While one train is being loaded by the shovelers at the unloading station, another train is being unloaded at the mixer and the third train is being hauled toward the mixer, if loaded; toward the switch, if empty.



PUMPING UNIT AND ELEVATED TANK.

As the empty cars at the unloading station are filled with sand and stone in the proper proportions, they are moved by mules to a side track, thus leaving the main track open for the load of empties coming from the mixer. These latter are delivered by the locomotive alongside the sand and stone cars to be filled, and the locomotive takes the loaded train back to the mixer. Here the process is the same. The cars, as fast as they are unloaded into the mixer, are taken by mules to a storage switch and these empties are taken back by the locomotive after it delivers the loaded train. The cement cars are usually placed in the middle of the train, but instead of being unloaded into the mixer, as in the case of the sand and stone, the cement is piled on a movable platform just back of the mixer. For the cement, the regular Koppel cars are used.

The success of this method depends to a large extent on a proper sequence of operations so that neither locomotive nor mixer is compelled to wait for the other. On the longer hauls, as well as on the very short ones, this is not always possible, but by the use of an additional mule to help out the locomotive at the unloading plant, there is seldom any delay.

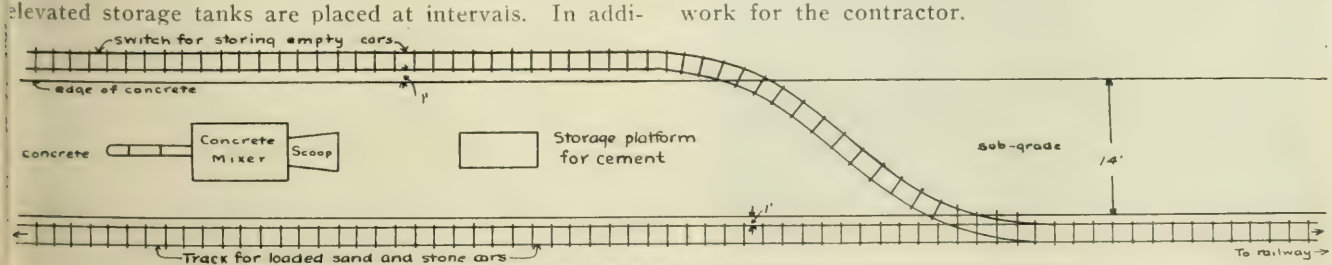
Water is secured from wells driven at intervals of about a mile along the road. These are connected by a 2-inch wrought iron pipe line, with plugged tees placed at intervals of 150 feet as connections. Small elevated storage tanks are placed at intervals. In addition to furnishing a uniform pressure, their use obviates the necessity of running the pumps all the time. "Domestic" and C. H. & E. pumping units driven by gasoline, are used.

The sub-grade is of an absorbent nature and it is necessary to wet it thoroughly before laying the concrete. Immediately after placing the concrete, it must be protected from the sun. This is accomplished by means of muslin shades tacked on frames about 9x15 feet in size. These are equipped with flaps to hang over the ends and are placed about 6 inches from the surface of the concrete. They are left in place until the concrete has taken its initial set, when they are removed and the concrete covered with a 2-inch layer of earth. It is sometimes necessary on excessively hot days to sprinkle the muslin in order to retard the drying out of the concrete surface. The earth covering is thoroughly wet every day and is kept so for 14 days.

In addition to the Koppel equipment and the steam roller, the contractor, E. C. Humphrey, Inc., of Hackensack, N. J., uses a Chain-Belt concrete mixer of ½-yard capacity. Most of the teams are hired locally and most of the men also are secured from near-by sections of the country. During seasons when farm labor is much in demand, it is rather difficult to secure a sufficient number of men, but at other times there has been no scarcity.

The road is being constructed by General Coleman du Pont as a gift to the state of Delaware, and as each section of ten miles or more is completed, it is turned over to the state. C. D. Buck is chief engineer and J. H. Cosby is assistant engineer and in general charge. A. B. Sandidge is superintendent and has charge of the work for the contractor.

UNLOADING THE MUSLIN SCREENS.



INDUSTRIAL RAILWAY AND GENERAL LAYOUT AT CONCRETE MIXER

MACHINE TRENCHING FOR WATER PIPES

Municipal Water Department Owns Machine, Which It Uses for All Trenching for Water Pipes—Record of Thirteen Days' Run.

By HENRY C. ALLEN, City Engineer, Syracuse, N. Y.

In establishing a recruiting camp near the city of Syracuse, it was decided to use for the water supply of the camp the public supply of the city of Syracuse. In order to do so it was necessary to extend the water main from the city to the camp with the greatest possible speed, since thousands of men were already on the ground without a proper supply.

In this emergency the quartermaster appealed to the city for aid and the city water bureau, through its superintendent, Charles A. Windholz, loaned its Buckeye trenching machine and the operators to dig the trench for the water main. The main was an 8-inch "universal" pipe, and the pipe was furnished and laid by the Edward Joy Co., of Syracuse. The trench was dug 4½ feet deep and 28 inches wide. The pipe line was located in a highway with a surface of macadam. The soil was principally clay, although some boulders and stone were encountered in places, which accounts for the small progress made on certain days.

The record of excavation was as follows, the machine working eight hours per day:

June 15	1,000 feet
16	850
17	950
18	850
19	600
20 (Sunday)	0
21	650
22	1,100
23	1,050
24	700
25	250
26	100
27 (Sunday)	0
28	800
29	260
13 days	9,160 feet

TRENCHING FOR WATER PIPE IN SYRACUSE.

Trench 4½ feet deep and 28 inches wide. Gravel soil with some boulders; 6 inches of concrete on the surface.

The cost of operation was $152.42 for labor, $76.80 for repairs to the machine and new parts, and $109.60 for gasoline and oil; a total of $338.82. This averages about 3.7c. per foot. It will be noticed that this is the cost of operation only and does not include any interest, depreciation or other overhead charges. It is estimated that the work done by this machine, which averaged about 700 feet per day, would have required 46 men had it been performed by hand labor. The trench was backfilled by hand.

The machine that was used is, as was stated, owned by the city water bureau and is used by it for excavating all trenches for water mains. It has three speeds, 1½ feet per minute, 3 feet per minute and 5 feet per minute. The soil in Syracuse is such that it is generally possible to operate it in the medium speed of 3 feet per minute.

STREET CLEANING IN HOUSTON

Motor Sprinklers Do Work More Cheaply Than Mule Drawn—Costs of This and of Sweeping—Pick-Up Work.

In his annual report for 1916, Matt Drennan, Commissioner of Streets and Bridges of Houston, Tex., gives figures showing the economy of motor sprinklers on street cleaning work. A motor sprinkler operated at a daily cost of $9.50 sprinkled 250 blocks twice daily and 57 blocks four times daily, a total of 1,083,000 square yards of street surface. In 1916 the machine was operated 262 days, sprinkling 283,746,000 sq. yds. of surface at a cost of 1 cent per thousand square yards. The items of cost were:

Chauffeur	$1,080.00
Gasoline	371.60
Lubricants	131.00
Repairs and renewals	1,255.40
	$2,838.00

Six mule-drawn sprinklers also were used on this work at a cost of $24 per day for mules and drivers and $1 for renewals, or $8,280 per year for 300 days' work and maintenance for 12 mules for the other 66 days. This equipment sprinkled 1,632,000 sq. yds. daily, or 489,600,000 sq. yds. during the season, at a cost of 1¾ cents per thousand square yards. The combined cost for mule and motor sprinkling was 1⅜ cents per sq. yd.

Sweeping by mules preceded by sprinkler cost $19.70 daily for 8 mules and 4 men, a total of $6,440 for 294 working days, and 52,000,000 sq. yds. of surface was swept at a cost of 12½ cents per thousand square yards. Two trucks, each trailing one sweeper, and preceded by a motor sprinkler, swept 300,000 sq. yds. daily at a cost of $25.45 for the trucks and sweepers and $9.50 for the sprinklers, a total of $34.95 a day. In 270 days, this apparatus swept 81,000,000 sq. yds. at a cost of 12⅛ cents per thousand square yards. The cost of operation was as follows:

2 Chauffeurs	$3,240
Gasoline	1,070
Oil and Grease	400
Truck renewals and repairs	2,255
Broom renewals anl repairs	1,175
Broom men	1,080
Foreman (half time)	490
	$9,710

Two combination sprinkler-sweepers, mule-drawn swept 47,334,000 sq. yds. at a cost of $9.70 per day, or 6 2-3 cents per thousand sq. yds. White wings cost 22½ cents per thousand square yards. The pick-up gang in the business streets, consisting of 6 men and 6 mules, cost $19 per day. It cleaned 20,870,000 square

yards at a cost of 33¼ cents per thousand square yards and removed 2,184 cubic yards of sweepings at a cost of $1.10 per yard.

Both mules and motor trucks were used in general pick-up work. To operate 2 trucks, 2 chauffeurs, 10 men and a foreman were required. The cost of this outfit was $38.60 per day and the work done included picking up the sweepings from 128,700 square yards of street surface and removing an average of 21 cubic yards of sweepings. On 270 days' work 34,750,000 yards were covered at a cost of 31¼ cents per thousand yards, and 5,700 cubic yards of sweepings were removed at $1.91 per cubic yard. The daily and annual cost was:

	Daily	Annual
Two Chauffeurs	$7.00	$2,160
Gasoline	3.60	972
Lubricants	1.00	362
Depreciation and repairs	4.00	1,080
Foreman	3.00	936
Ten Men	20.00	5,400
	$38.60	$10,910

Six mule teams, 12 men and a foreman proved more economical at this work than did the motor trucks. This gang cost $40.50 per day and picked sweepings from 185,900 square yards of surface, removing 45 cubic yards of sweepings daily. The total cost for picking up was 29 cents per thousand square yards and $1 per cubic yard for sweepings removed, operating 270 days.

The daily and annual cost was:

	Daily	Annual
12 men	$24.00	$7,056
12 mules	12.00	3,528
12 mules idle 72 days		864
Foreman	2.50	810
Repairs and renewals	2.00	600
	$40.50	$12,858

TOOTHING OUT BLOCK PAVEMENTS.

The Department of Public Works of Baltimore, Md., has recently adopted the use of a chipping hammer operated by compressed air for toothing out granite block and vitrified brick pavements when making repairs to cuts that have been made in such pavements or at other places. The highways engineer, R. M. Cooksey, to whom we are indebted for this information, says that there is no doubt the same appliance would give good results in making similar repairs on concrete pavements, although they have not yet used it for that purpose.

The outfit employed in Baltimore consists of a Number 2 portable compressed air outfit, with hose connections for hammers, sold by Chris D. Schramm & Son, and two Number 2 Thor chipping hammers purchased from the Independent Pneumatic Tool Company. Three hammers were purchased so that one could be held in reserve in case one of those in use should get broken or out of order. The average day's work for this outfit is 300 lineal feet of toothing at $6.79 per day, or 2.26 cents per foot. The total cost is made up as follows, the prices for material and labor being those of 1916, which will be slightly increased for 1917:

5 gallons of gasoline	$1.05
1 gallon of cylinder oil	.26
1 gallon of polarine oil	.23
1 special laborer	2.50
1 special laborer	2.75
Total cost per day	$6.79

In doing this same kind of work by hand, the city used stone cutters in preference to laborers, finding the former to be more economical because the laborers ruined so much good paving. In this hand work, the average day's work for a stone cutter was 26 lineal feet of toothing. As he was paid $4.50 per day, this gives about 18 cents per foot, as compared to 2.26 cents per foot with the machine. In this calculation, Mr. Cooksey does not allow anything for interest and depreciation on the machine, but even allowing for a very short working season and short life, it does not seem possible that the addition of this would anywhere near double the cost; so that the cost of hand work would apparently be at least four or five times as high as that by the pneumatic machine.

MACHINERY REPLACES MEN ON CONCRETE ROAD BUILDING

Hand Grading Eliminated by Use of Road Grader—Motor Trucks Used to Transport Materials—Unloading Sand and Stone.

In building a concrete road between Milford and Devon, Conn., the contractors, R. D. Daley & Co., of New Haven, are hiring good men where they are needed, but are using machinery to reduce the number necessary to carry on the work economically. About 35 men are now employed on the job, which consists of laying 5 miles of 18-foot single course concrete road, reducing the grade on one hill and moving a trolley track from the side to the center of the road. The latter part of the work is to be done for the village of Milford. This has not yet been reached and so far the work has consisted of tearing up the old macadam road, removing about three inches of the top material and laying the concrete pavement. The problem of construction is simplified by the fact that traffic is by-passed and no provision has to be made for caring for it.

A feature of the job is the elimination of hand work on grading. The old macadam surface, which was badly

LOADING STONE INTO TRUCKS FROM COAL TRESTLE AND TEMPORARY BIN.

rutted, was broken up by means of a scarifier attached to a Buffalo Pitts roller. About three inches of the surface had to be removed, the sub-base made flat and rolled. A "Little Giant" road grader shaved off the surplus material, moving it to the sides of the road, and leveled the base so that practically no hand work was necessary. This grader will be used on all work where the cut does not exceed 6 or 8 inches. The heaviest grading on the whole job is about 3 feet and the average for the heavy grading, which covers only a short section, is about 20 inches. On this work a Keystone traction excavator will be used.

No local sand is available and it is necessary to secure all construction materials from outside. The sand is obtained from the Phoenix Sand & Gravel Co., of New York, and is shipped from Long Island in scows. These are unloaded by means of buckets or skips lowered into the scows and shoveled full by the men. By using several skips, no delay occurs in loading trucks, except the time required to hoist and dump the loaded buckets. On this work two horse-drawn trucks and two motor trucks, one Locomobile and one Riker (also made by the Locomobile Co.) of about 8,000 pounds capacity, are used. The motor trucks have proved very economical and are used for practically all the hauling, even where the haul does not exceed half a mile.

Stone is furnished by the Connecticut Trap Rock Co., and is brought in by rail. It was the original intention to unload the stone by shoveling from the cars directly into the truck; but the contractors were able to rent space at an overhead coal trestle, where a bin was rigged up so that the cars of stone could be dumped into it by gravity and the stone discharged from it by chutes into the trucks. This afforded a quick and economical method of loading, the average time required for loading a 4-ton truck, including that occupied in backing into position, being about 4 minutes. The average load is about 5 tons and on shorter hauls this is increased. On a 1-mile haul the usual schedule is: loading, 4 minutes; unloading, including turning and backing, 3 minutes; in transit, 20 minutes. On this haul the trucks average about 10 tons per hour each.

Cement is shipped in by rail and is usually hauled by teams to a distribution storehouse. This storehouse is one designed by Mr. Daley and is constructed of built-up sections, bolted together. The sections are so designed that when taken down they may be transported easily, and with them houses or sheds of any desirable size may be constructed quickly. The salvage value of the timber used in them is high.

Water is secured from the municipal water supply system and is furnished along the road through a 2-inch wrought iron line. Plugged tees are used in place of couplings at intervals of about 100 feet. These allow a ready supply of water.

The road is constructed 6 inches thick at the edges and 8 inches at the center and the concrete is mixed 1:2:4, Knickerbocker portland cement being used. Twenty-five men are required to operate the Koehring mixer. The make-up of the mixing gang is as follows: 4 men shoveling stone, 4 men wheeling stone, 2 men shoveling sand, 2 wheeling sand, 1 man wheeling cement, 1 man emptying cement, 5 concrete spreaders, a foreman, an engineer, a fireman, a finisher and 2 form men. This gang can turn out somewhat over 300 feet of finished road a day, but lately the non-delivery of stone has handicapped and delayed the work.

Expansion joints composed of a double thickness of tar roofing paper are placed every 35 feet. Wooden forms, made of 2x6-inch timbers are used. After placing, the concrete is brought to the proper cross section with a template and then given a wood float finish. Before the final set the surface is broomed and is then covered with earth and allowed to cure for about 10 days.

SOME ROAD GRADING WRINKLES

Street Grading With Wheel Scrapers and With Steam Shovel—Scarifier and Scraper Hauled by Road Roller—Removing Trees.

Some facts and figures concerning the grading of street roadways in contract work done by him has been furnished us by G. W. Lawrence, a contractor of Newark, N. J. As Mr. Lawrence points out, each job is a problem in itself and the contractor must meet conditions as they arise; but the suggestions offered by the methods of others will frequently assist in meeting those conditions.

In one job recently completed, this company used four Baker-Maney 4-wheeled scrapers, each of one cubic yard capacity, using a hoisting engine instead of a snap team for loading the scraper. The total amount of excavation in this job was 4,156 cubic yards. The dump was about 750 feet way, making the average round trip of the scraper 1,500 feet. These scrapers averaged about 40 trips in a

CONSTRUCTION WORK ON ROAD BETWEEN MILFORD AND DEVON, CONN.

9-hour day. The final cross-sections of the work, when compared with the total number of loads, showed that the average amount carried was just about one cubic yard per load. The soil was part top soil and part clay and the depth of excavation averaged about four feet. The daily cost of moving 160 yards was as follows:

One foreman	$5.00
One snapman	3.00
One hoisting engine	4.00
One engineer	2.00
One-third ton coal	2.00
Oil and water	.50
Repairs	.35
Four scrapers (1 c. y. capacity)	28.00
One plow team	7.50
One plow man	3.00
Depreciation on 4 scrapers	6.00
Total cost per day	$63.00

This gives about 40 cents a cubic yard. This cost could have been reduced by using two more scrapers on the work, as the four scrapers did not keep the loading engine busy, and the plow team could have loosened from 350 to 400 cubic yards per day.

On another piece of street excavation being carried on at about the same time, the contractor used an 18-B Bucyrus steam shovel and teams which made a round-trip haul of 2,000 feet. In this case the cost per cubic yard was 47 cents. The increase over the cost by scrapers is accounted for by the expense of moving the steam shovel in and out again, and a daily charge of $15 a day against the shovel for wear, repairs and depreciation and full time for the crew during rainy weather, as against $6 a day charged against the four scrapers. On a short haul, the 4-wheeled scrapers have the advantage over the steam shovel of saving the expense of planking the pit and building a pontoon for the shovel, soil conditions being equal.

Hand labor was replaced in street grading by this firm by using a Peerless 10-ton roller with a scarifying attachment, behind which was drawn a team and a Baker-Maney scraper, scooping up the soil which had been loosened by the scarifier. This was used for final grading after the steam shovel work had stopped, and such grading was done in this way as low as 2 cents a square yard.

On another piece of work it was necessary to remove 110 trees in the right-of-way, these trees averaging two-foot trunks and being very high. The trees were removed with four men at $3 each and a foreman at $5 by employing a steam roller to pull them down and break them up. The wood when broken up was removed by a 3½-ton Packard. The average cost per tree was $10.

SEWER CLEANING IN ABERDEEN.

Included as a part of the sewer system of Aberdeen, S. D., are four blocks of 10-inch storm sewers, which the city has had considerable difficulty in keeping clean. Efforts were made to flush the sewer and also to pull an auger through it, three men and a team being used in the latter effort; but no considerable part of the dirt was removed in that way, and the sewer remained in a very unsatisfactory condition. The city engineer, Frank Le Cocq, informs us that he concluded, a few weeks ago, to try some other method, and a Kuhlman sewer cleaning machine was obtained. In order to use this it was necessary to force a string of rods through the sewer, and this required some time, as the sewer was found almost filled with mud. Once a passage had been forced through the sewer by means of the rods, however, the machine, operated by four men, cleaned about 100 feet of sewer a day, removing about 35 cubic feet of mud. Mr. Le Cocq reported that up to the time of writing, June 22, this gang had cleaned four blocks of 10-inch storm sewer. He believes that now that the men have learned how to use the machine, they can perform such work more quickly in the future.

MODERN ROADMAKING MACHINERY*

Types and Capacities of Machines to Be Used on Different Kinds of Construction—Care and Use of Machinery.

Road construction is carried on under widely varying conditions and the selection of machinery for the work involves a careful study of these conditions. The capacity of the machines to be purchased, the power required and the most desirable weights for rollers, should be determined in advance. Equipment once used and found unsuitable cannot be sold or exchanged except at a heavy discount.

The ordinary operations in the construction of country roads are grading, quarrying, crushing, hauling, watering and rolling. Each of these operations can be performed by up-to-date machinery as against more primitive methods formerly in use. For ordinary grading operations, work far superior to that done under the old method of shovel and scraper is now obtained from the use of grading machines and in less time. Steam or compressed air has superseded hand work for drilling.

Efficiency demands that stone placed on the road be rolled and finished immediately, for if but partly finished, it is sure to be disturbed by traffic and much of the work undone. The spreading and partial rolling of long stretches of stone is the cause of much unnecessary expense. Economical practice also requires that both crusher and roller be working to capacity, but that the roller be not rushed to such an extent as to encourage inferior or half-finished work.

A common source of loss in crushing road material is the attempt to operate a crusher of too limited capacity. Selection of a suitable size of crusher should be based more on the jaw opening than on the rated capacity. The daily output of crushers with jaw openings less than 9 inches by 16 inches or 10 inches by 18 inches has been found too limited to satisfactorily supply the average road making outfit, and smaller machines should not be considered. Similarly, the motive power should be sufficient to drive the machine at full speed under full load. The time lost per day due to slowing down when the load becomes heavy amounts to a considerable total. Frequently the boiler may also supply steam to run a rock drill or other machine, under which conditions ample capacity becomes necessary. Where a portable or traction engine is used, it should not be less than 20 horsepower.

Special attention should be given to the lubrication of the crusher. The conditions under which such a machine works are severe. Owing to dust, automatic oiling devices have not, in general, been found reliable and good lubrication is better assured by frequent applications from an oil can. In hot weather a heavier grade of oil may be used than in cold weather.

Even with the best of care, the wear on crusher bearings is very rapid. In the selection of an outfit, a point worth considering is the ease with which bearings and other wearing parts may be replaced. Some crushers now on the market are supplied with replaceable babbitt bearings, which can be fitted in a few minutes. Ordinary

*Abstract of paper read before the Fourth Canadian and International Good Roads Congress by W. Huber, Assistant Engineer, Ontario Department of Highways.

chilled cast iron jaw plates wear rapidly. In spite of a much higher initial cost, jaws of manganese steel are cheaper in the end and, by reason of much slower wear, give a more uniform product.

The selection of screens for separating the crushed stone is important. For road work, two screens giving three sizes of stone are advisable, the sizes depending on the character of the stone. With limestone the perforations giving best results are 3-inch and 1½-inch; for granite or trap, the perforations should be rather smaller, 2½-inch and 1-inch holes being satisfactory. A bad practice is the use of three screens, which gives four sizes, including a size ¾-inch to 1½-inch, which when used by itself is more detrimental than useful.

Rolling is one of the most important operations and judgment should be used in the selection of the roller. The weight will be governed principally by the sub-grade on which it will work. On old gravel or stone roads, a 12-ton roller may be used to advantage, but this size should never be exceeded on country roads, and where roads have not been previously metaled or where the sub-grade is not firm, better results will be obtained with a 10-ton roller.

Motor driven rollers have come into prominence in recent years and the choice between steam and gasoline or kerosene may well be considered. Owing to its longer and wider use, steam is more generally understood and heretofore it has been easier to find operators for the steam rollers. The condition is now changing and the motor roller is rapidly gaining favor. Advantages claimed for it are the elimination of delays incurred through the necessity of firing and taking on water, estimated at 1½ to 2 hours a day, and lack of smoke and soot. Provided with a competent operator, a motor roller can undoubtedly perform more work in a given time than can a steam driven roller.

If a steam roller is selected, it should be one with a double-cylinder engine. This type has many advantages over the single-cylinder which more than compensate for the slight extra cost. Combined with smoother running, they are able to start from any position.

The greatest wear on a roller is seen on the rear wheels, which soon become rounded. When this occurs consolidation is slower and not so well done. With rear wheels having detachable rims, such as are supplied in some rollers, the cost of renewing rims is much smaller than where the entire wheel must be purchased.

The roller is, or should be, the limiting factor of the organization and, as it is an expensive part of the outfit, it should be worked to capacity. For this reason, a capable operator is a good investment. Rolling must be performed so that each passage of the roller accomplishes something in the final consolidation of the stone. Careless or inefficient handling will not only increase the work necessary for the final consolidation but will give a less satisfactory result. Excessive rolling wears the sharp edges off the stone, thereby destroying an important factor in the prevention of internal movement.

Satisfactory consolidation can be secured only when stone is confined at the sides. Unless a shoulder is furnished to keep the stone within the required width, the weight of the roller will cause it to spread. A shoulder may be formed by the grader, or, where the sub-grade is of old metal which it is desired to leave undisturbed, a small trench may be picked at the edge.

Efficiency and economy of rolling depend on continuous operation. Delays due to lack of water may be prevented by the use of two tanks. Considering how much delay may be so caused, the cost of operating the extra tank is negligible.

As a means of moving large quantities of material, team haulage is fast losing its importance. The increasing wages of men and teams has made this method almost prohibitive and it is being replaced by mechanical traction. The cost of team haulage is usually between 20 cents and 40 cents per yard-mile, averaging 25 cents to 30 cents on country roads. Under very favorable conditions, mechanical haulage has been accomplished for 5 cents per yard mile, while a fair average is about 8 cents to 12 cents.

A common mistake in the puraches of hauling machinery is that of selecting equipment which is too large and too heavy. Traction wagons for country roads should not exceed a size of 3 or 4 yards. The larger sizes are too heavy for some roads and are more difficult to handle. Better results can generally be obtained by reducing the size of the cars and increasing the number. If two or three large cars are used for trailers, the dropping of one car on account of a hill or bad section of road means a large percentage of reduction in the paying load. Nothing but reversible cars should be used.

The entrusting of general care and repairs to the operator of each machine is inefficient and extravagant. Continuous and efficient operation of equipment can be assured only when responsibility for the condition of the entire outfit is centered in a capable master mechanic. He should frequently inspect each machine and supervise all repair work. A reasonable stock of repair parts likely to be needed should be kept on hand.

Care of machinery during periods of idleness is almost as important as its care during operation. A few months' exposure to the elements or to conditions promoting rust will cause more depreciation than a whole season's legitimate use.

APPLYING TAR TO WOOD BLOCK PAVEMENT.

The use of a small squeegee machine operated by hand for applying a flush coat to bitulithic and bituminous macadam pavements generally is more or less common; but such a contrivance has recently been used for applying a flush coat of tar to creosoted wood block pavement in Dayton, O., by Ed. Ryan, contractor for the paving; and we believe that one or two other contractors are using the same contrivance (leased from Warren Bros. Co.) for the same purpose. This flush coat machine consists of a small tank for holding the heated tar, under which is fastened a rubber squeegee, the tank being supported by two wheels, and partly by the squeegee when no pressure is exerted on the handle. An opening in the bottom of the tank, provided with a tapered plug, permits the tar to flow onto the pavement just back of the squeegee, which is then spread by drawing the contrivance backward.

FLUSHCOAT SPREADING MACHINE.

The squeegee having the shape of an arc of a circle, the tar is drawn ahead rather than flowing out at the ends. When seen by the writer, one of these squeegees was spreading a uniform coat of tar as fast as a man could walk—say 250 feet a minute.

FLUSHER DISPLACES LABORERS AND TEAMS.

Erie, Pa., in May last purchased a motor-driven street flushing machine which weighs four tons without the load and carries 1,200 gallons of water. The machine is operated by gasoline and was furnished by the Tilt Wagon Co. W. D. Kinney, superintendent of the Department of Streets and Public Improvements of Erie, states that since receiving the wagon they have been trying out routes and systems of operation and have not yet determined the most efficient method of using the wagon and therefore can not give any definite figures concerning its operation. He states, however, that by using it they have eliminated from the street cleaning service 12 laborers and 4 teams, thus saving $61 per 10-hour day. The men so displaced were put on construction work, chiefly putting the dirt streets in condition by crowning and grading them.

MACHINERY ON A NEW YORK HIGHWAY

Grading With Plow and Scraper—Motor Truck Hauling and Spreading—Asphalt Distributors—Rollers as Tractors—Oil Hauled at Night—Handling Stone by Gravity at Quarry.

By W. HARDENBERGH.

Handicapped by a lack of labor and by abnormal, almost continuous rainfall and interrupted by heavy traffic which could not go on other roads because of the lack or poor condition of detours, contractor Nathan E. Young, of Binghamton, N. Y., has had to employ considerable labor- and time-saving machinery and devices in resurfacing the 14-foot macadam highway between Jeffersonville and White Sulphur Springs, N. Y. This stretch of highway includes part of state road Number 699 and part of road Number 700 and covers three contracts for repair work. The total mileage is 10.6 and the contract price approximately $70,000.

Work on this road was begun last fall on the Jeffersonville end and about two miles had been completed before winter set in. This spring, as soon as the frost was out, work was started again. This road, the main highway between Liberty, a railway town, and an inland farming district, has heavier traffic, both wagon and automobile, than any other road in that section. In the spring or in times of heavy rainfall, heavy wagons and automobile trucks not infrequently do serious damage to the surface and, as a result, the road soon breaks up. For this reason it was thought necessary to place a Telford type sub-base wherever the macadam had been worn away entirely or the bottom seemed faulty. The installation of 5,100 yards of 6-inch sub-base, as called for in the specifications, has necessitated the tearing up of the old surface in many places.

The work of tearing up the old surface was done with a Syracuse pavement plow attached to a 15-ton Kelly-Springfield roller, which is used also for rolling the sub-base. After the old surface has been broken up thoroughly, a Climax scraper is attached to the roller and used to scrape the loose dirt to the sides, forming a shoulder of sufficient height to retain the sub-base and the stone courses. Three men are required to hold the plow and two men to operate the road scraper. The contractor estimates that on fairly long stretches the use of this scraper saves from forty to fifty men.

Common field stone, such as are found in stone walls or on the surface of the ground in pastures, are used for the bottom course. Two trucks are required for hauling and three men to load the trucks. The stones are dumped along the side of the roadbed, sometimes toward the middle, and placed by hand. Usually only one-half of the roadbed is covered at a time, in order to allow traffic to pass with least difficulty. Then the road is finished gradually. The stones are pounded with sledges, then covered with gravel filler to the depth of an inch or two and rolled. The gravel is obtained from a pit nearby and hauled by wagons and motor trucks. With six men shoveling, the five-ton automobile trucks are loaded in twelve minutes.

Where no sub-base had to be installed, the old surface was scarified with an Acme scarifier and then reshaped with a scraper and by men with rakes. After rolling the surface, a course of Number 1 stone, sufficient to make three inches when consolidated, was added and then rolled.

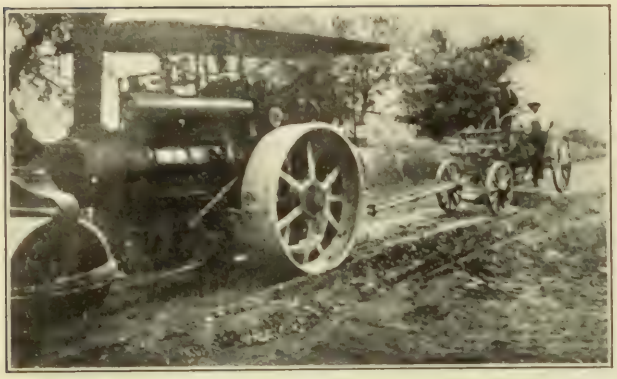
Except where the hauling was close to the crusher, motor trucks were used to haul and distribute the stone. Two five-ton White spreader trucks were used. It took an average of 2 minutes to load these trucks from the crusher bins and unloading required a minute to get into position and about half a minute to spread the load. Only one man is required to level off the stone where these trucks have spread their load.

On short hauls, where horse trucks are used, from four to six men are needed to distribute the stone drawn by two trucks and dumped in rows along the roadbed. Except on the short hauls, the motor trucks in every way demonstrated their superiority over the horse-drawn vehicles.

A coat of John Baker, Jr.'s Texaco Oil is applied on top of the coarse stone by means of two asphalt distributors of 660 gallons capacity each, both equipped with air compressors and fire boxes. The temperature called for in the specifications is from 250° to 350° F., and the contractor applies the oil at a temperature of from 275° to 300°. The 660-gallon tank covers approximately 300 feet of surface. The tanks are drawn by a ten-ton Monarch roller, which is used at other times for rolling the stone. A steam connection from the roller operates the air compressor on the tanks.

As soon as the oil is applied, six men spread on Num-

TRUCK SPREADING STONE.

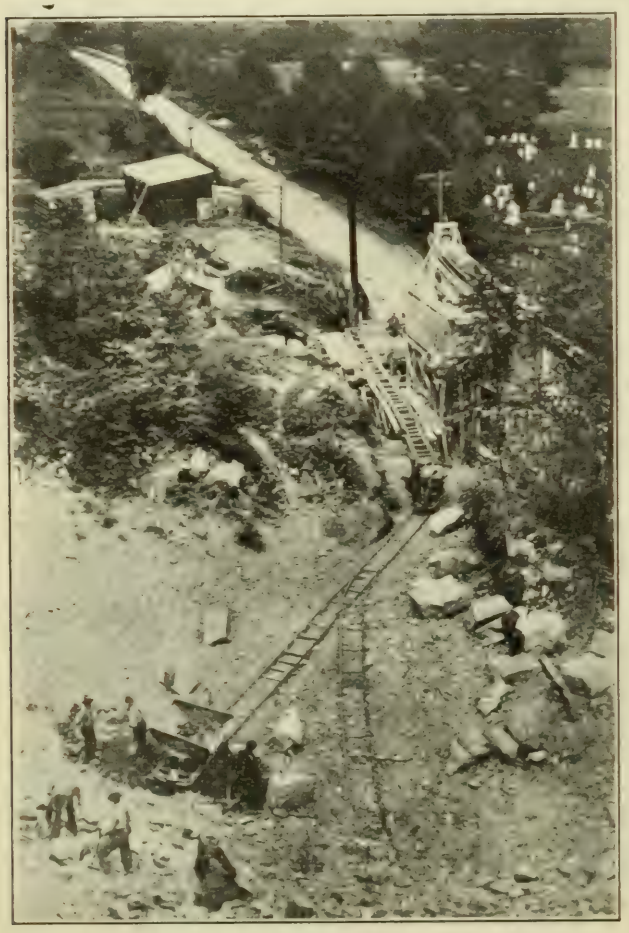


SPREADING STONE WITH SCRAPING GRADER.

ber 2 stone from piles which have been dumped conveniently alongside the road. The road is rolled thoroughly. Within a few hours another coat of oil is applied to this surface, covered with the finest grade of stone and then thoroughly rolled. When the rolling is complete, the finished road should have a five-inch crown.

The oil has to be brought a distance of twelve miles from Callicoon. For this purpose the White trucks are used. The material in the cars at Callicoon is heated with steam to keep it mobile. The trucks make about three trips in a ten-hour day, although they are used more frequently at night, when the oil is brought to have on hand when the men begin work in the morning.

For the first part of the road, 83,000 gallons of Texaco are being used. Ninety thousand gallons of Standard Bituminous Material A will be used for the rest of the road.



QUARRY PIT, CRUSHER PLANT, AND TRACK CONNECTING THE TWO.

By using the two White motor trucks, twelve horse-drawn trucks have been displaced. Mr. Young still has sixteen Champion trucks on hand, but hardly ever finds it necessary to use more than four of them. The average mileage of each truck for a ten-hour day is from 60 to 75, although frequently they make from 100 to 105 miles a day, 110 being the maximum. On long trips they average five miles to the gallon of gasolene and four miles on the shorter trips and on the trips to Callicoon, with the oil distributor as trailer.

In hauling stone, the contractor finds that the motor trucks will make from eight to ten trips each ten-hour day to the White Sulphur Springs end, which is a distance of six miles, or twelve for the round trip. Included in this distance are two long, heavy grades.

The crusher plant is situated with a view to saving labor. A rock ledge close to the road was selected and the crushing outfit erected there. A Climax No. 2½ crusher is used. It has been in use for seven years and gives complete satisfaction to the contractor

The ledge is situated far enough up and above the crusher to make possible the use of two Koppel side-dump cars and 180 feet of track, and give just enough slope to the track to permit bringing a loaded car down the track by gravity. A Wood steam drill is used to drill the ledge, which is broken up with explosives. The workmen load the blasted stone into a car, which is taken by two men down to the feeding pit of the crusher and dumped, and the two men push the empty car back by hand. Meanwhile, on a Y-branch track, the other car has been loaded and is ready to be brought down. With these two cars, three men are kept busy at the feeding pit. The contractor believes that the gravity arrangement saves at least three and possibly four horse cars.

Care in drilling the holes results in finely broken stone and few boulders. A small-diameter drill is used and the holes are sunk close together. The stone is a blue sandstone, well adapted for road-building.

An item of economy not to be overlooked is the arrangement of the Koppel track alongside the crusher bin to permit of the loading of a car with the coarse material in the end bin which has failed to pass through the cylinder screen meshes. Commonly this stone is dumped on the ground or used as sub-base.

From eighteen to twenty-two men are employed at the crusher, the majority of them for loading the Koppel cars. Eleven men are employed for sub-base installation, three of them for loading gravel filler, three for holding the breaker plow, one man for spreading the filler, and the rest for loading or placing the stone. From eight to ten men are required in the gang which constructs the macadam surface. One or two of these are used for spreading the stone and others at various jobs, such as raking stone, forming shoulders, or covering oil.

DUMPING QUARRY CAR INTO CRUSHER PIT.

The road scraper is used for whatever grading or dirt work has to be done and the contractor estimates that it does more than 75 per cent of the work which formerly was done with shovels.

In places where the roadbed is badly worn, or where the ground is springy, the sub-base is often put in to the depth of eight inches or a foot.

The contractor finds that passing traffic causes much trouble, especially on unbound stone. He says that it is impossible to smooth out the ruts made in loose stone by heavy wagons or automobiles anywhere near as well as it was originally. The traffic also interferes with the work and often causes a loss of time. But detours are either lacking or else in poor condition and the contractor finds it impossible to shut the road. The only remedy is to spread stone only as it can be bound and rolled.

EXPLOSIVES FOR LOOSENING SOIL.

While in some sections and among certain contractors the use of dynamite or black powder for loosening the soil and facilitating its removal is more or less common, its use is probably not nearly so general as it might be advantageously. For removing stumps and boulders its value is generally recognized but it has been found economical in many cases to use it in excavating drainage ditches along the sides of roads and in assisting grading down to the road level.

Where a ditch is to be dug in hard soil, this may be loosened and to a considerable extent blown out by punching a number of shallow holes along the line of the ditch and charging these with small amounts of dynamite. The holes should be deeper than the bottom of the ditch and can be spaced two or three feet apart. Where the ditch is in saturated soil, it is recommended that the holes be placed about 18 to 24 inches apart and 50 per cent dynamite be placed at a depth a little less than that of the ditch. One hundred or more of these charges may be fired with a single cap. If the ground is dry or cold, the holes are punched further apart and loaded with low-freezing explosive, each charge being primed with an electric blasting cap so that all may be fired at one time. For small ditches, quarry powder or other with similar characteristics will give good results. A single row of holes can be used to blast out a ditch from 1½ to 4½ feet deep and from 4 to 7 feet wide in dry soils and 5 to 9 feet wide in wet soils. If wider ditches are required, two rows of holes 3 or 4 feet apart, fired at the same time, can be used.

Where a road passes through low and poorly drained stretches where there is no economical means of draining off the large amount of standing water (and the water must be removed if the roads are not to remain wet and swampy a greater part of the year), this condition can be relieved by "vertical drainage" if there is a porous stratum a short distance below the impervious stratum which holds the water and causes the swampy condition. To drain the water down to this porous stratum (which will carry it away), it is necessary to provide numerous openings through the hard pan or other impervious surface stratum. This can be done by driving a number of holes, but it is less expensive to break up the material into numerous cracks by the use of explosives placed in holes carried at intervals down to the porous stratum. This method can not be used, however, where there is much quicksand or slimy silt above the impervious material, since this semi-fluid material will run down into the cracks and fill them up. Under these conditions it is necessary to open a rough well or crater down to the porous stratum and fill this up with brush, stones or other porous matter, the hole being then covered with porous top soil.

Still another method of using explosives is in making deep cuts, as in grading or widening a road. In this case the excavation is given a comparatively vertical face or bench and a line of holes is drilled or punched down from the top parallel to the face and spaced back a distance about one-quarter greater than the depth of the cut and about the same distance apart. The holes are loaded with low strength dynamite (20 or 30 per cent), the amount used in each hole depending on the hardness of the ground and depth of hole. If the cut is deeper than 6 feet, the holes are seldom placed more than that distance from the face. The holes should not be carried below grade as this may loosen the sub-grade too much. With low grade explosive the hole may be filled about one-half full of dynamite and carefully tamped to the collar. A number of holes should be fired at once with electric caps, as better results are obtained in this way.

On some road work in Pennsylvania last year one contractor used dynamite for blasting outfall drainage ditches; he also used it for loosening the ground ahead of the steam shovel, which permitted speeding up the action of the shovel. A trial of explosives used in this way convinced him that it was more economical than relying entirely upon picks, plows and hand shovels for this work.

MOTOR VEHICLES IN MUNICIPAL WORK

Kinds of Work They Are Used For and by What Departments—Loads Carried and Detailed Costs of Operation—Municipal Garages and Repair Shops—Motor Trucks and Roads.

Of the hundred or more cities reporting in reply to a questionnaire recently sent out by Municipal Journal, regarding the use and maintenance of motor vehicles by the municipalities, 13 maintain municipal garages and 21 have municipal repair shops. About 35, or half of those having motor vehicles, keep more or less accurate record of the gasoline and oil used, repair costs and other expenses.

In the majority of the cities, reports indicate that the use of the trucks does not damage the roads, but ten of the cities report damage and four others "slight"; nine cities, all in the north, report that they are unable to use motor vehicles in winter; four do not use them "all" the time and one not off paved roads in the winter. Only one makes any distinction in the uses of trucks on paved and unpaved streets.

In 26 of the cities, motor trucks are used by the street department, in 15 by the public works department, in 16 by the water department, in 10 by the police department, in 11 by the health or garbage and street cleaning divisions, and in 6 by the electrical department. In many of the cities, especially in the smaller ones, the trucks are used for a variety of purposes, as is indicated in Table I.

Only two cities, Hartford, Conn., and Asheville, N. C., report the use of electrics. Practically all the others are gasoline. The sizes include practically all from a light runabout to a 15-ton truck.

TABLE I—MOTOR VEHICLES OPERATED BY CITIES.

City and State.	Capacity.	No. of Each.	Kind.	Work Used on.	Dept. Used By.	Genl. Inform't'n.
Arkansas:						
Little Rock	.....	2	Ford	Trips with prisoners	Police	
	.....	1	Moon		Police	
	.....	3	Ford	Inspection	Health	
	.....	3	Ford	Inspection	Public Works	
	.....	1	Mitchell	Inspection	Street	
California:						
Los Angeles	2½-ton	9	Gasoline and Distillate	Collections	Garbage & Rubbish	
	5-ton	13		Hauling	St. Maint. & Replacing	
	2-ton	1		Materials and Supplies	.....	
	1½-ton	1			.....	
	1-ton	1			.....	
	2-ton	2		Sewer clean. & maint.	Sewer	
	¾-ton	1		Handling Material	Warehouse	
	1½-ton	1		Street Signs	Warehouse	
Pomona	.....	2	.....	General	Street & Park	
Redlands	.....	1	Ford	Waterwks. repair	Water	
Connecticut:						
Hartford	5-ton	1	Electric	Street work	Street	
Middletown	1-ton	1	Gasoline	Repair	Water	
Stamford	.....	1	Ford	Utility	Street	
	.....	1	Pope-Hartford	Ambulance	Police	
	.....	1	Overland	General	Police	
Illinois:						
Chicago	5-ton	1	Gasoline	Waterwks. Constr.	Yards and stores	
	2-ton	3	Gasoline	Waterwks. Constr.	Yards and stores	
	1½-ton	5	Gasoline	Waterwks. Constr.	Water Constr.	
	1-ton	9	Gasoline	Pipes & Meters	Pipes & Meters	
	.....	22	Ford	General	Various	
Cicero	.....	1	Ford	.....	Water	
	.....	2	Ford	Utility	Bldg. & Electrical	
Decatur	¾-ton	1	Gasoline	Sewer Cleaning	Sts. & Pub. Imps.	
	2-ton	1	Gasoline	Park	Park	
	2-ton	1	Gasoline	Police	Police	
	.....	4	Touring	Utility	Health & Engrg.	
Evanston	3½-ton	1	Gasoline	Street Repair	Street Repair	
	1-ton	2	Gasoline	Refuse	Street & Alley	
Peoria	.....	1	Mitchell	Supervision	Garbage	
	.....	1	Ford	Supervision	City Engr.	
	.....	1	Ford	Supervision	Street-Supt.	
	.....	1	Ford	Inspection	Dairy Inspector	
	.....	1	Ford	Fumigation	Health	
	.....	1	Ford	Ambulance	Health	
	.....	2	Hupmobile	Inspection	Public Works	
	.....	2	Cadillac	Patrol & Amb.	Police	
	.....	1	Stearns	Emergency	Police	
Urbana	.....	1	Ford	Patrol	Police	
Indiana:						
Peru	.....	2	Ford	Patrol	Electric Light	
	.....	1	Motorcycle	.....	Police	
South Bend	1-ton	2	Gasoline	.....	Engineering	
	¾-ton	1	Gasoline	.....	Water Works	
	.....	5	Ford	.....	Water Works	Roadsters
	.....	3	Ford	.....	Water Works	Touring
	.....	2	Gasoline	.....	.....	Patrol
	.....	4	Touring	.....	.....	2 to 7 passenger
Terre Haute	.....	2	.....	.....	Police	
	.....	1	.....	.....	Street	
Iowa:						
Boone	.....	1	Ford	Utility	Police	
Burlington	.....	1	Gasoline	Repair Work	Street	
Massachusetts:						
Holyoke	.....	1	Gasoline	Flush. & Clean.	Public Works	
Norwood	¾-ton	1	Gasoline	Construction	Electrical	
	½-ton	1	Gasoline	Construction	Water	
	½-ton	1	Gasoline	Repair	Electrical	
	.....	2	Touring	Patrol	Police	
	.....	1	Touring	Inspection	Public Works	
Springfield	5-ton	7	Gasoline	Street Work	Streets & Engrg.	Two of these mchns. are used as tractors with 4 trailers.
	5-ton	1	Steam	Hauling Materials	Streets & Engrg.	
	2-ton	2	Gasoline	Sewer & St. Clean.	Streets & Engrg.	
	1-ton	3	Gasoline	General	Streets & Engrg.	
Michigan:						
Detroit	¾-ton	1	Gasoline	Garage Service Car	Public Works	
	1-ton	1	Gasoline	Sidewalk Repair	Public Works	
	15-ton	1	Gasoline	Street Cleaning	Public Works	
	1-ton	2	Gasoline	Asphalt Repair	Public Works	
	6-ton	7	Gasoline	Asphalt Hauling	Public Works	1 tractor and 9 trailers also are in use by the department.
	6-ton	5	Gasoline	Garbage Hauling	Public Works	
	2-ton	1	Gasoline	Garbage Hauling	Public Works	
	3½-ton	1	Gasoline	Garbage Hauling	Public Works	
	4-ton	1	Gasoline	Sewer Department	Public Works	
	1-ton	1	Gasoline	Sewer Department	Public Works	
	1-ton	3	Gasoline	Engineering Dept.	Public Works	
	6-ton	1	Gasoline	Paving Department	Public Works	
	7½-ton	1	Gasoline	Street Cleaning	Public Works	
Flint	7½-ton	1	Gasoline	Flushing	Streets	Mack
	5-ton	2	Gasoline	Paving	Engineering	G. M. C.
	5-ton	1	Gasoline	Flushing	Street	Tiffin
Ironwood	.....	1	Gasoline	General	Public Works	Overland
Kalamazoo	.....	1	Ford	General	Water	.....
	.....	1	Haynes	Patrol	Police	.....
Manistee	1-ton	1	Gasoline	Miscellaneous	Water	Trailer is used
Marquette	5-ton	1	Gasoline	Clean. & Constr.	Public Works	.....
	1-ton	1	Gasoline	Line Work	Light & Power	.....
	½-ton	1	Gasoline	Wiring & Emerg.	Light & Power	.....
	.....	4	Gasoline	Transportation	Various	1,200 lbs.
Sault Ste. Marie	.....	1	Studebaker	General	City Engr.	.....
Minnesota:						
Mankato	.....	1	Ford	Repair	Water Works	.....
Red Wing	¼-ton	1	Gasoline	Hauling & Genl.	Water	.....
	.....	2	Ford	Utility	Pub. Wks. & Pol.	.....
St. Paul	5-ton	1	Gasoline	Construction	Pub. Works	.....
	2-ton	1	Gasoline	Sewer Repairs	Pub. Works	.....
	.....	7	Touring	Inspect. & Genl.	Pub. Works	.....
Mississippi:						
Vicksburg	3½-ton	1	Gasoline	Flushing	Street Cleaning	.....
New Hampshire:						
Rochester	2-ton	1	Gasoline	Hauling	Highways	Two trailers are used
	¾-ton	1	Gasoline	Hauling	Waterworks	
New Jersey:						
Asbury Park	3½-ton	1	Gasoline	Sprinkling	Public Works	.....
Passaic	.....	1	Ford	Conveyance	Street	.....

MOTOR VEHICLES OPERATED BY CITIES (CONTINUED).

City and State.	Capacity	No. of Ea.	Kind.	Work Used on.	Dept. Used By.	Genl. Inform'tn.
New York						
Binghamton	5-ton	1	Gasoline	Tractor	Garbage	Six trailers are
	5-ton	1	Gasoline	Flush. & Oiling	Street	used for various
	2-ton	1	Gasoline	Utility	Street	work
	1-ton	1	Gasoline	Utility	Sewer	
Elmira	1½-ton	1	Gasoline	General	Public Works	
	1-ton	1	Gasoline	General	Water Board	
	½-ton	1	Gasoline	General	Water Board	
Ithaca		1	Ford Truck	General	Public Works	
		1	Ford	Water	Water Works	
Kingston	3½-ton	1	Gasoline	Carting	Bd. of Pub. Wks.	
North Tonawanda		1	Gasoline	Sweeping	Public Works	Elgin Sweeper
Oneonta	½-ton	1	Gasoline	Emergency	Public Works	
Port Jervis		1	Gasoline		Street Dept.	
North Carolina						
Asheville	6-ton	1	Electric	Flushing	Street Cleaning	
	2-ton	1	Electric	Garbage	Street Cleaning	
	2-ton	1	Gasoline	Hauling	Street	
	1-ton	1	Gasoline	Water	Water	
		1	Touring	Transportation		Buick.
Charlotte	1-ton	2	Gasoline	Hauling Trash	Health	
	½-ton	1	Gasoline	Hauling	Health	
Durham		1	Touring	Transportation	Engineering	
Wilmington		3	Touring	Transportation	Various	
North Dakota:						
Grand Forks		2	Ford	Transportation	Various	One is truck.
Ohio:						
Dayton	5½-ton	2	Gasoline	Hauling	Streets	
	5½-ton	1	Gasoline	Hauling	Water Works	
	3-ton	2	Gasoline	Street Cleaning	Streets	City uses
	1-ton	2	Gasoline	Repairs & Supply	Streets	one trailer.
	1-ton	2	Gasoline	Water Extensions	Water	
	2-ton	1	Gasoline	Supplies & Parks	Welfare	
	2-ton	1	Gasoline	Work House	Welfare	
Pennsylvania:						
Altoona	2-ton	1	Gasoline	Street Cleaning	Street	
		1	Gasoline	Sweeping	Street	Elgin Sweeper.
		1	Touring	General	Street	
Franklin	2-ton	1	Gasoline	Hauling	Street	
		1	Ford Truck	Hauling	Street	
		1	Ford	General	Street	
Harrisburg	2-ton	.	Gasoline	Asphalt Repair	Streets	
Williamsport	1-ton	5	Gasoline	Hauling	Highway	
	1-ton	1	Gasoline	General	Highway	
Tennessee:						
Memphis		17	Touring	Supervision	Various	
Texas:						
Brownsville	1-ton	1	Gasoline	Trouble	Water & Light	
	1-ton	1	Gasoline	Patrol	Police	
	1-ton	1	Gasoline	Trash Wagon	Sanitary	
Virginia:						
Portsmouth		4	Touring	Patrol & Inspect.	Various	
Washington:						
Aberdeen	2-ton	1	Gasoline	Hauling Supplies	Water	
	1½-ton	1	Gasoline	Hauling Supplies	Water	
Tacoma	¾-ton	1	Gasoline	Line Construction	Light	Trailer on
	½-ton	1	Gasoline	Line Construction	Light	¾-ton.
West Virginia:						
Wheeling	¾-ton	1	Gasoline	Meters & Repairs	Water	
		3	Ford	General	Various	
Wisconsin:						
Ashland	1½-ton	1	Gasoline	Street	Street	1 Trailer.
Janesville	1-ton	3	Gasoline	Utility	Various	Ford Trucks.
		1			Police	
Milwaukee	2-ton	8	Gasoline	Hauling	Various	
	¼-ton	5	Gasoline	Hauling	Water & Street	
		16	Touring		Various	
		11	Roadsters		Various	
Wausau		3		Transportation	Various	
Wyoming:						
Cheyenne	2-ton	.	Gasoline	Hauling	Streets	

TABLE II—COSTS OF OPERATION.

City and State.	Time Covered	Average Load	Type of Machine	Cost Per Mile for— Tires	Gas or Cur'nt	R'prs	Total	Average Mileage Per Day	Remarks
California:									
Los Angeles	Jan., 1916, to	2.53 tons	Distillate	$0.0222	$0.0139	$0.0332	$0.0693	58	collecting garbage
	July, 1917	2.56 tons	Distillate	.0204	.0128	.0240	.0572	55	collecting garbage
Illinois:									
Chicago	1916	5 tons	Gas truck	$0.054	$0.043	$0.05	$0.147	38.4	
	1916	2 tons	Gas truck	.026	.028	.029	.083	43.5	
	1916	1½ tons	Gas truck	.021	.027	.014	.062	32.1	
	1916	1 ton	Gas truck	‡.05	.021	.015	.086	41.73	
	1916	800 lbs.	Gas truck	‡.016	.013	.01	.038	35.77	
Evanston	1 year	¾ ton	Gasoline	.02	.04	.026	....	25	garbage.
Massachusetts:									
Springfield	1 year	5 tons	Gas truck	....	....	....	.23	15	2.4 miles per gal.
	1 year	1 ton	Gas truck	....	....	....	.09	9	7.8 miles per gal.
Michigan:									
Detroit	1916	12 tons	Tractor§	....	....	....	.18	....	asphalt
	1916	12 tons	Tractor§	....	....	....	.184	....	garbage
	1916	1 ton	Gasoline	....	....	....	.08	....	engineering
	1916	5 tons	Gasoline	....	....	....	.081	....	sewer
	1916	2 tons	Gasoline	....	....	....	.06	....	sewer
	1916	6 tons	Gasoline	....	....	....	.14	....	paving
	1916	1½ tons	Gasoline	....	....	....	.10	....	sidewalk
New York:									
Binghamton	1 mo.	2 tons	Gas truck	....	....	....	.0875	....	621 mi. per mo.
	1 mo.	1 ton	Gas truck	....	....	....	.0525	....	591 mi. per mo.
	1 mo.	5 tons	Tractor	....	....	....	.09	....	695 mi. per mo.
Washington:									
Tacoma	4 mos.	1,000 lbs.	Gas truck	.0755	.0265	.0716	.1736	27.5	
	4 mos.	1,000 lbs.	Gas truck	.0234	.0250	.0255	.0739	21.9	
Wisconsin:									
†Milwaukee	Jan.-May		Touring	.011	.023	.010	.044	34.9	Ave. 5 cars.
	Jan.-May		Fords	.013	.024	.012	.049	27.5	Ave. 16 cars.
	Jan.-May	1½ ton	Gas truck	....	.065	.002	.067	21.5	Ave. 3 cars.
	Jan.-May	1 & 2 ton	Gas truck	.053	.053	.038	.144	17.4	Ave. 5 cars.
	Jan.-May		Touring	.028	.058	.080	.166	31.6	Ave. *5 cars.
	Jan.-May		Miscel'n's.	.029	.042	.054	.125	18.0	Ave. 5 cars.

*Two of these cars were overhauled, thus adding to the repair cost. †Does not include oil or miscellaneous items in cost record. ‡Cost for pneumatic tires. §With trailer.

TABLE III—MISCELLANEOUS INFORMATION.

City and State	Does City Maintain: municipal garage	Does City Maintain: municipal repair shop	Are Records Kept of: mileage of each truck	Are Records Kept of: gasoline and oil used	Are Records Kept of: tires, repairs and maintenance	Are motor vehicles a satisfactory substitute for horses?	Is gasoline or electric preferred?	Do trucks damage roads?	Do weather or road conditions require trucks to be laid up at times?	Are trucks used on unimproved as well as improved roads?
Arkansas:										
Little Rock	No	Yes	No	Yes	Yes	Yes	Gasoline	No	No	Yes
California:										
Los Angeles	Yes	Yes	Yes	Yes	Yes	Yes	Gasoline	No	Yes	Yes
Pomona	No	No	..	..	..	..	.....	..	..	..
Redlands	No	No	No	No	No	..	.....	..	..	..
Colorado:										
Grand Junction	No	Yes	Yes	..	Yes	Yes	Gasoline	No	No	Yes
Connecticut:										
Hartford	No	No	Yes	Yes	Yes	..	.....	..	..	..
Middletown	No	No	No	..	No	Yes	Gasoline	No	No	Yes
Stamford	No	No	No	No	No	Yes	Gasoline	Yes	..	..
Illinois:										
Chicago	Yes	Yes	Yes	Yes	Yes	Yes	Gasoline	No	Seldom	Yes
Cicero	No	No	No	..	..	..	.....	..	..	..
Decatur	No	Yes	No	Yes	Yes	Yes	Gasoline	Yes	Off of paved streets	Yes
Evanston	No	No	Yes	Yes	Yes	Yes	..	Yes	No	Yes
Peoria	Yes	No	..	Yes	Yes	Yes	Gasoline	No	..	Yes
Urbana	No	No	No	Yes	Yes	Yes	Gasoline	No	No	Yes
Indiana:										
Goshen	..	..	..	..	..	Yes	Gasoline	No	No	Yes
Peru	No	No	No	..	..	Yes	Gasoline	No	Never	Yes
South Bend	Yes*	No	No	No	No	Yes	Gasoline	No	No	Yes
Terre Haute	No	Part	No	No	No	Yes	Gasoline	No	No	Nearly
Vincennes	No	No	No	No	..	..	.....	..	..	..
Iowa:										
Burlington	..	..	..	..	..	Yes	Gasoline	No	No	..
Kentucky:										
Frankfort	No	No	..	Yes	Yes	Yes	Gasoline	No	No	Yes
Massachusetts:										
Norwood	..	Yes	Yes	Yes	Yes	Yes	.....	..	..	..
Springfield	No	Yes	Yes	Yes	Yes	Yes	Gasoline	No	No	Yes
Winthrop	..	..	..	..	..	Yes	Gasoline	No	No	Yes
Michigan:										
Cadillac	No	No	..	Yes	Yes	..	.....	..	..	..
Detroit	Yes	Yes	Yes	Yes	Yes	Yes	Gasoline	No	In Asphalt Department	Yes
Flint	Yes	Yes	No	No	No	Yes	Gasoline	No	Yes	Impr.
Ironwood	No	No	No	No	No	Yes*	Gasoline	Yes	Yes	Yes
Kalamazoo	..	..	..	..	..	Yes	.....	..	No	..
Manistee	No	No	No	No	No	Yes	.....	No	..	Yes
Marquette	No	No	Yes	Yes	Yes	Yes	Gasoline	Slightly	In winter	Yes
Minnesota:										
Mankato	..	..	..	..	..	Yes	Gasoline	No	In winter	Yes
Red Wing	No	No	No	..	..	Yes	Gasoline	No	Not often	Yes
St. Paul	Yes	Yes	Yes	Yes	Yes	Yes	Gasoline	Yes	No	Yes
Mississippi:										
Vicksburg	No	No	No	Yes	Yes	Yes	Gasoline	No	No	No
New Hampshire:										
Rochester	No	No	No	Yes	No	Yes	Gasoline	No	In deep snow	Yes
New Jersey:										
Passaic	No	Yes*	No	No	..	..	.....	..	..	..
New York:										
Binghamton	Yes	Yes	Yes	Yes	Yes	Yes	Gasoline	Yes	No	Yes
Elmira	No	Yes	..	Yes	Yes	Yes	Gasoline	No	No	Yes
Geneva	No	No	No	No	No	Yes	.....	No	No	Yes
Ithaca	Yes	Yes	Yes	Yes	Yes	Yes	Gasoline	No	No	Yes
Kingston	..	..	No	No	No	Yes	.....	No	No	Yes
Little Falls	No	No	No	No	No	Yes	Gasoline	No	Yes	Yes
Oneonta	No	No	No	No	No	..	.....	..	..	..
Port Jervis	No	No	No	Yes	Yes	Yes	Gasoline	Yes	Yes	Yes
North Carolina:										
Asheville	No	No	No	Yes	No	Yes	Gasoline	No	No	Yes
Charlotte	No	Yes	No	Yes	Yes	Yes	Gasoline	No	No	Yes
Durham	No	No	No	Yes	Yes	Yes	Gasoline	Some	..	Yes
North Dakota:										
Grand Forks	No	No	No	No	No	Yes	Gasoline	No	No	Yes
Ohio:										
Dayton	Yes	Yes	No	Yes	Yes	Yes	Gasoline	Yes	Yes	Yes
Pennsylvania:										
Altoona	Yes	No	Part	No	No	Yes	Gasoline	No	No	Yes
Franklin	Yes	No	No	Yes	Yes	Yes	.....	No	Not often	Yes
Harrisburg	..	..	No	No	No	Yes	Gasoline	No	No	Yes
Williamsport	Yes	No	Yes	Yes	Yes	Yes	Gasoline	Not much	Seldom	Yes
Tennessee:										
Memphis	..	Yes	No	Yes	Yes	Yes	.....	Don't know	No	Yes
Texas:										
Brownsville	No	Yes	No	Yes	Yes	Yes	Gasoline	No	No	Yes
Temple	No	Yes	..	..	..	..	.....	..	..	..
Virginia:										
Portsmouth	No	No	..	Yes	Yes	Yes	Gasoline	No	..	..
Washington:										
Aberdeen	No	Part	No	No	Yes	Yes	Gasoline	Slightly	No	Yes
Tacoma	Yes	Yes	Yes	Yes	Yes	Yes	.....		Not much	Yes
West Virginia:										
Wheeling	Yes	No	No	No	..	Yes	Gasoline	Yes	No	Yes
Wisconsin:										
Ashland	No	Yes	No	Yes	Yes	Yes	Gasoline	..	No	Yes
Janesville	No	No	Yes	Yes	Yes	..	.....	..	..	..
Madison	No	No	No	No	No	Yes	Have gas	No	No	Mostly on paved streets
Milwaukee	Yes	Yes	Yes	Yes	Yes	Yes	.....	..	No	Yes
Wausau	No	No	No	Yes	Yes	Yes	Gasoline	Not much	No	Yes
Wyoming:										
Cheyenne	No	..	..	Yes	..	Yes	Gasoline	Yes	Yes	Yes

*For some of the cars.

INDUSTRIAL RAILWAYS

Comparison as to Efficiency and Cost with Motor Trucks, Tractors and Teams—Use in Highway Work in Two States.

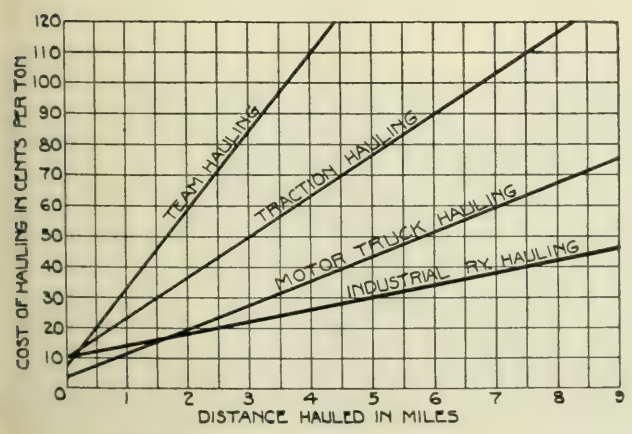
Two or three articles in this week's issue describe the use of industrial railways on highway construction work, and in the following paragrapns a few other instances of its use will be described briefly.

First, however, reference will be made to a paper prepared by Prof. T. R. Agg, dealing with the selection of road building machinery. Prof. Agg states that the selection of transportation equipment should be governed by price, rate of depreciation, cost of operation and speed of operation under various weather and other conditions. Under normal conditions the rates of travel may be taken as 2½ miles per hour for teams, 8 to 10 for motor trucks, 3 miles for tractors and 10 miles for industrial railways. The capacities may be assumed as 2 tons for teams, 5 tons for motors, 15 tons for tractors and 20 tons for industrial railways. Costs of operation, including interest, depreciation, maintenance, supplies and labor will perhaps average 59c. per hour for teams, $2.00 for tractors, $3.00 for motor trucks and $4.00 per hour for a train of 10 cars and 1 locomotive. The chart shows that on hauls from 1 mile up, the industrial railway has the advantage, particularly in costs; also that as the haul increases, the industrial railway's economy of operation maintains a big ratio of increase.

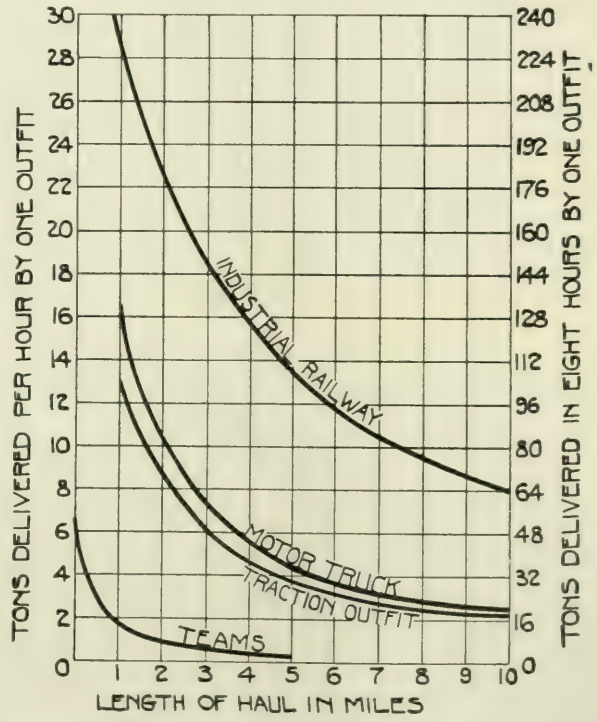
This point is illustrated by some figures given by Fred Tarrent, division engineer of the Illinois Highway Department. In the case cited by him, 25,473 cubic yards of stone were moved by industrial railway over an average haul of 3.17 miles in less than 5 months, calculated from the time the equipment was received at the point of freight delivery until it was placed back on the freight cars. The cost was 14.8c. per ton-mile, including rent, freight charges both ways, and putting the equipment in first class shape before it was returned. If the equipment had been owned by the contractor the cost would have been about 11c. after allowing 20 per cent for depreciation and upkeep. The cost of team haul on this job would have been 28c. or 30c. per ton-mile, but as a matter of fact it would have been impossible to have secured enough teams to complete the work in double the time. The equipment in this case consisted of two 20 h. p. locomotives, 6 miles of portable track and 60 side-dump, V-body cars. Four men laid the 15-foot sections of the track, about 2,000 feet being laid a day. One man was employed to look after the condition of the track and correct any low spots or loose connections, as a good track assures better speed and prevents derailments. Upon the completion of this job, the central loading station and the entire railway equipment was transferred 6 miles overland to a new loading station in 6 days, by picking up the track in the rear, hauling it by the cars and placing it ahead of the forward end of the track. The cost of this transportation was $320.

In this job each train was manned by an engineer and two brakemen, the brakeman on the front end helping with the firing and other work on the engine. These two brakemen dumped the cars in from 20 to 30 minutes. Loading was done in from 10 to 20 minutes by a gasoline belt conveyor from a pit into which the stone was dumped from the railroad cars, two men attending to the loading. Mr. Tarrent named as the advantages of this equipment the practical independence of the labor situation and reduction of men on the pay roll; ability to haul more cheaply and quickly and under almost any weather conditions; no expense for resurfacing sub-grade as is the case when wagons or tractors are used, as these leave the road more or less cut up; light weight of the outfit, making it possible to cross light bridges; and small amount of space required for operation.

In two concrete jobs in Michigan, a 7-ton, 3-h.p. locomotive and 60,000-pound double-side-dump V-body cars, and five 16-foot freight cars, together with the necessary portable track (all Koppel equipment), handled 27,812 tons of pebbles, sand and cement, over an average haul of 2.75 miles at a cost of 10.5c. per ton-mile. This includes office charges and proper overhead, but takes no account of the hauling of armor plates, joint filler, empty cement sacks and the transportation of men from one point to another; it also includes a depreciation charge for an entire year, the plant being used for 4 months on this work. The road commissioners who used this outfit stated in their report: "As compared with other methods of haul where conditions are similar to these two jobs, we have saved approximately the cost



COMPARISON OF COSTS OF HAULING BY DIFFERENT CONVEYANCES.



RELATION BETWEEN LENGTH OF HAUL AND WORK DONE.

of the entire equipment." In operating this outfit there was employed an operator for a clam shell bucket which loaded the dump cars from the railroad cars or stock piles, 4 laborers, 1 teamster and team to haul the cars to a siding where trains of from 30 to 42 cars were made up, and an engineer and brakeman to operate the train.

For short hauls, electric storage battery trucks can be obtained with special bodies which will carry up to 3,000 pounds over any going where the wheels can get a grip and the road clearance is 5½ inches or more. These trucks and tractors can be furnished with flanged wheels to carry loads and pull trailers with special bodies on industrial railway systems in sand pits, quarries, supply yards, etc. The heavier tractor types have a capacity of 15,000 pounds and will negotiate grades up to 20 per cent. These electromobiles will displace from 3 to 10 men, depending on the nature of the work.

MOTOR VEHICLES IN SPOKANE CITY WORK

Fifty-four in Service—Thirteen Sprinkler Trucks Built by City Fire Department—Use Made of the Several Vehicles.

By HENRY F. NELTHORPE.

The city of Spokane, Washington, began the accumulating of motor vehicles in 1911 with a view to securing greater efficiency in the street department. Several autos also were purchased for engineers and superintendents. Following this it was decided to build a garage and repair shop in which two men were employed. Since that time the number of motor vehicles has been increased to 54 and the garage has been enlarged to three times its original size and employs eight men and has again become too small to house all of the machines. The 54 motor vehicles owned by the city are as follows: Three trailers, six 1-ton trucks, three 1½-ton trucks, two 2-ton trucks, three 3-ton trucks, thirteen 5-ton trucks, one 7-ton truck, nineteen Ford cars (some of which have been converted into light trucks), two Dodge cars, one Oldsmobile, and two Yuba tractors.

In 1914 the city undertook to build thirteen 5-ton trucks, using for this purpose the members of the fire department, who worked in their leisure time. These cost the city between $2,000 and $2,100 each, besides the labor. One 7-ton truck is now under construction. These trucks were built for street sprinkling purposes to take the place of 40 horse-drawn carts so used. The accompanying table gives the number and capacity of each size and kind of car, the department by which it is used and the kind of work which it does. The photograph, which is taken outside of the city garage, shows most but not all of the city's motor vehicles.

Each motor sprinkler carries a tank of 1,200 gallons, instead of the 550 gallons which the horse-drawn tanks hold, and in general the cost per mile is about one-quarter as great. In some instances, however, the city continues to use horse-drawn sprinklers, mostly on hills. The average cost per vehicle is about as follows:

	Motor	Horse
Gallons of water used in a day.....	67,000	18,103
Miles traversed or sprinkled.....	30	6
Cost to operate and maintain.....	$7.50	$6.00
Cost per mile.....	.25	1.00

The cost of operation is higher than in some cities, but this is largely accounted for by the fact that the city pays $6.00 a day for a man and team, $4.00 per day for truck drivers, 75c. an hour for labor at the garage, 23c. a gallon for gasoline, and 50c. a gallon for lubricants.

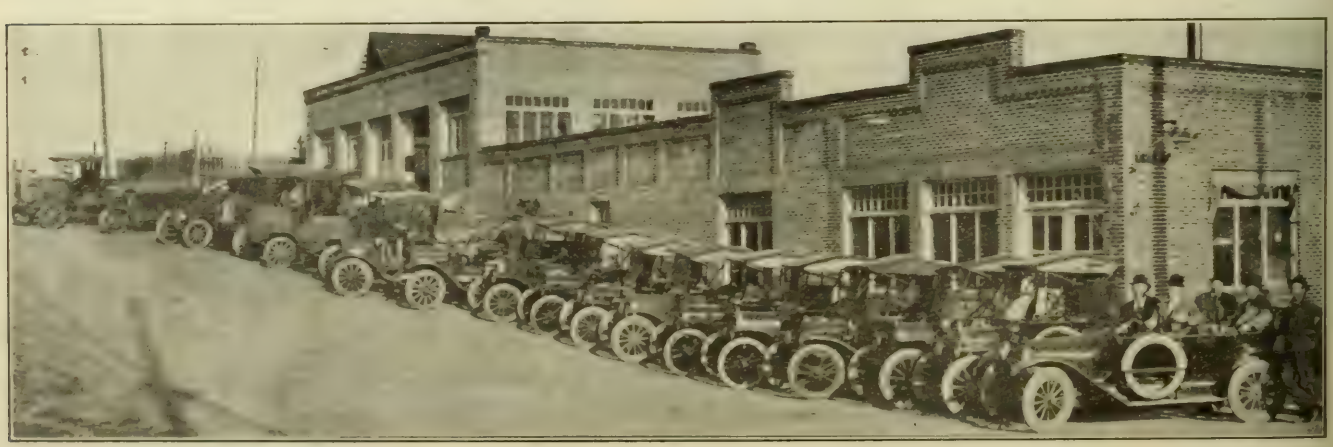
An air-pressure pump has been installed on several of the motor-driven sprinklers and an attachment so that when the sprinkler reaches a wide street, some of which are 75 and 100 feet wide, the car can be made to sprinkle the entire width at one trip. Paved streets are not sprinkled.

The street cleaning division uses motor air-pressure flushers in the business and central districts and horse-drawn air-pressure flushers in the outlying districts. It is found that the same amount of work can be accomplished by the motor flushers at less cost than by the horse-drawn, the cost of flushing per thousand square yards being 25c. by motor and 28c. by horse.

Previous to 1916 the streets were re-graded with horse-drawn graders, steam rollers and trucks, but since that time the city has purchased two tractors and uses them to draw the graders and finds that it can accomplish double the amount of work. In 1916 it re-graded 261 miles of streets for $4,746.15, or $18.18 per mile. In this case also the prices paid were higher than in many cities, the foreman being paid $110 a month, tractor driver $5.50 a day and laborers $3.50 for an 8-hour day. One advantage of the tractor over horse and roller is that it is not necessary to unhitch the grader from the tractor to go to the end of the street to turn around, for the tractor can turn in its own length. Each tractor is provided with a trailer which carries sufficient oil and supplies for the tractor.

In winter the tanks are removed from the trucks and replaced with wagon boxes for hauling snow, when this has to be carried some distance. The tractor also draws graders to clean gutters, although where there are large sewers a horse drawing a large scoop is provided by which the snow is hauled to a manhole.

A great advantage is experienced by the use of autos



by superintendents, inspectors and emergency men, for installing water meters and making repairs, there being no comparison between the slow moving horse and the light auto or converted truck in respect to the amount of work accomplished, ground covered and dispatch with which one can reach the desired location. This auto service costs an average of about 4c. a mile. In addition to these, four motorcycles are used in the water division for inspectors and men to turn water on and off and to read meters. The cost of these motorcycles is about 1c. per mile.

By the use of motor trucks in the sewer division, the amount of work done by the division has been tripled. One is used to haul hose and equipment for flushing and cleaning sewers and catch basins, the other to haul the dirt from the catch basin to the dump in large buckets. As a majority of the catch basins are in the outlying districts, and long hauls are required, the advantage of the truck over the slow moving horse is very great.

The superintendent of the incinerator has five motor trucks for collecting ashes and debris from houses and expects to purchase more, from which it would appear that he considers the motor vehicle preferable to the horse-drawn for this work also, although some cities have come to the conclusion that this is not the case.

The records of the garage are kept in considerable detail, an important item in which is the garage work order sheet. This form is made out in triplicate, the total for each month being made out for each machine. At the top of this order are spaces for recording the make of machine and where purchased; the month and year to which the record applies; the speedometer reading at the end of the month, at the beginning of the month, and the total mileage for the month. One line is provided for each day of the month, and the vertical columns are headed as follows: hours of labor; gallons of gasoline; gallons of distillate; pints of oil; grease, tools, waste, polish; repair parts, nuts, screws, etc.; accessories. Each of the last three columns is divided into two, one containing the number of the request for the material and the other the cost or value. The last two columns provide for entering the number of new tires put on and their value, while the make, size and the mileage of the old tire taken off are recorded also. At the foot of the sheet are given the total cost for the month and the cost per mile.

LABOR-SAVING DEVICES ON CONCRETE PAVING.

The P. F. Connelly Paving Company, of Little Rock, Arkansas, uses a number of labor saving devices, which Mr. Connelly lists as follows, in a brief note to Municipal Journal:

First is a Kinney penetration machine for distributing

MOTOR VEHICLES—CITY OF SPOKANE, WASHINGTON.

No.	Capacity.	Department Used By.	Kind of Work Used For.
1	3-ton	Street	Hauling debris off street after cleaners.
2	3 "	"	Hauling debris off street after cleaners and sprinkling.
3 to 11	5 "	"	Sprinkling, hauling snow, etc.
12 to 15	5 "	"	Street flushers.
16	1 "	"	Utility truck, hauling lumber for crosswalks and bridge repairs, tools, etc.
17	1 "	"	Hauling debris off street after cleaners.
18	7 "	"	Not completed, but intend to use it as sprinkler and utility truck.
19	1 "	"	Hauling debris off streets and utility truck.
21	2-pass. auto	"	Street superintendent.
22	2 " "	"	Emergency auto, making inspection on streets at day time, placing red lights at night.
23	2 " "	Garage	Shop car at garage.
24	2 " "	Sewer	Sewer inspector on installation of sewers.
25	2 " "	Engineering	City engineer.
26	2 " "	Asphalt	Paving superintendent.
27	1½-ton truck	"	Hauling materials from plant to repair streets.
28	1½ " "	Sewer	Hauling hose and equipment to flush out catch basins and sewers.
29	2 " "	"	Hauling debris from catch basins to dump.
30	3¼ " delivery	Water	Water engineer to find and repair leaks in water mains.
31 to 34	1-pass. motorcycle	"	Water meter readers, inspectors, and emergencies.
35 & 36	2 " auto	"	Installing water meters.
	2 " "	"	Meter repairs.
37	2 " "	"	General repairs.
38	1-ton truck	"	General repairs.
39	3 " "	"	Water main construction and hauling material.
40	5-pass. auto	"	Water superintendent.
41	5 " "	Health	Health quarantine officer.
42	5 " "	"	Sanitary inspector.
44	5 " "	"	Dairy and milk inspector.
45	2 " "	"	City health officer (Dr. Anderson's private car, City maintains same).
46	5 " "	"	Contagious hospital, carrying patients to and from hospital.
47	2 " "	Weights and Measures	Inspector of weights and measures.
48	5 " "	Legal	Claim agent.
49	2 " "	Crematory	Crematory superintendent.
50	2 " " (box)	"	Hauling small dead animals off street.
51	1½-ton truck	"	Hauling ashes and debris.
52	3 " "	"	" " " "
53 & 55	1 " "	"	" " " "
54	2 " "	"	" " " "

The photographs on this and the opposite page show 27 of the 54 motor vehicles used by the city of Spokane, lined up on two sides of the municipal garage. Those on this page are 5-ton sprinkling trucks.

asphalt in road work. Next, an Archer concrete mixer which it requires only one man to operate, this man feeding the cement, applying the water, receiving the material, dumping the charge and moving the machine. A Spaulding rock spreader is next in order; following this is a "Rapid" rock loader for loading stone from cars to wagons. Next I would place a Stroud & Co. grader for loading dirt from street to wagons. Roughin's concrete cut-off saves four men on concrete pavement work. P. F. Connelly's adjustable finishing long-handled trowel and jointer also saves four men. Last but not least, the use of No. 5 shovels instead of No. 2 saves both labor and money.

COMPRESSED AIR IN STREET EXCAVATING AND TAMPING

Drills and Picks Used in Removing Rock, Concrete and Macadam—Excavating and Tamping Trenches—Some Performance Figures.

By H. L. HICKS.

In replacing hand labor with power for street work there are ordinarily available steam power, electric power and internal combustion engines. There are some classes of work in which the appliances are so small that the power must be conveyed from a central plant, and for this purpose steam or compressed air may be conveyed by hose or electric current by wire. The use of compressed air has several advantages over steam, one being the avoidance of the considerable loss of heat and energy through long lengths of steam hose.

The more common appliances operated by pneumatic machinery include drills, picks, trench tampers, riveting and calking hammers. For furnishing the compressed air there are on the market light-weight portable air compressors and motors combined, the motor being either steam or internal combustion engine or electric motor. The internal combustion engine possesses the advantage over steam of being moved readily as the work progresses, thus eliminating the expense of extended pipe lines from semi-permanently installed steam plants. The latter also needs shelter from the weather, while the portable unit is generally provided with a roof and curtained from storms. The illustration shows a gasoline driven compressor in which a 2-cylinder vertical compressor is belt-driven from a 4-cylinder gasoline motor. Belt drive possesses the advantage of absorbing the shock and jar of starting and stopping. In the machine illustrated a cone clutch permits releasing the load when starting.

Electric motor-driven compressors also are largely of the belted type and are well suited for street work where electric current is available; but because of their more universal adaptability the gasoline-driven types are more generally employed.

A compressor of the type illustrated was used by a New York city contractor for supplying air to two jackhammer drills in drilling conduit holes 2 inches in diameter in concrete bridge abutments to an average depth of 2½ feet. The record for one week was as follows:

	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Hours worked.....	9	9	8	9	7	9
Gasoline consumed (gals.)	20	20	18	20	16	20
Cost per gallon....	$0.23	$0.23	$0.23	$0.23	$0.23	$0.23
Lubricating oil used (quarts)	2	4	2	2	2	4
Cost per quart.....	$0.10	$0.10	$0.10	$0.10	$0.10	$0.10
Drill hole footage..	300	290	275	295	250	300

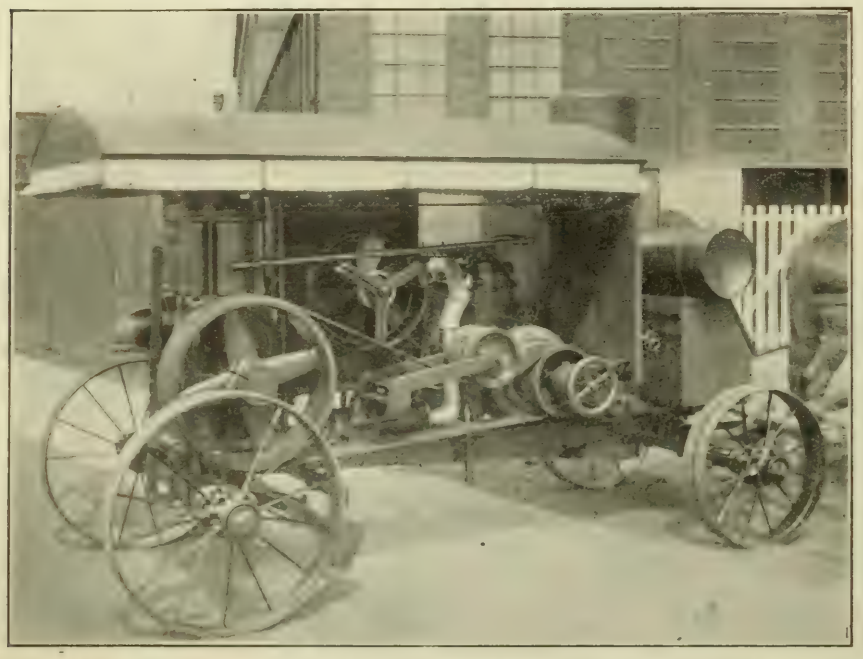
Labor costs: 1 driller, $2.50 per day; 1 driller, $3 per day; 1 compressor operator, $4 per day.

From this it can be figured that the total cost for compressor operation and workmen was 4.9 cents per foot of hole.

The jackhammer drill referred to is a self-rotating hand-hammer drill extensively used in road construction, street repair and quarry work, for drilling rock and concrete pavements, picking bituminous road surfacing, digging trenches and numerous other jobs. By fitting them to a light feed shell mounting they can be used for driving a small sewer tunnel.

A contractor on a Virginia road 13 miles in length used an outfit of this kind for drilling out boulders and succeeded in making nearly a foot a minute in limestone, making 300 to 400 feet of drill hole in a 10-hour day at a cost of less than 5 cents a foot. In describing this work he said: "I am sure we put down many a 3 or 4-ft. hole before the average laborer would get his hammer and steel and find a place to sit down and hold the steel to be driven by hand."

(Continued on page 110)



GASOLINE-DRIVEN PORTABLE COMPRESSOR—INGERSOLL-RAND.

AIR-OPERATED JACKHAMMER AT WORK IN TRENCH.

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SOLVING THE LABOR PROBLEM.

Several times during the past two months we have expressed the opinion that the problems of shortage and cost of labor could be solved successfully by the more extensive use of machinery and mechanical appliances. In this issue we have presented descriptions of the actual use of a number of such, from complete industrial railway equipments to pneumatic tampers, picks and chipping hammers. The use of trucks, tractors, scrapers, caterpillars, trenching machines, road rollers, rock spreaders and other contrivances in ways not commonly employed, are described by contractors and engineers who have tried them out. Others have found loading bins, loading elevators, etc., great savers of time and money. Practically all of these descriptions are right from the jobs where they are now being used; and where it was possible to obtain cost figures, we have given them.

In some of the work described, the saving has been effected by special adaptation of appliances to the eliminating of labor. For example, one contractor divides the body of his industrial railway car so that the stone and sand for a concrete pavement are placed in the desired proportion in each car, and the car is dumped directly into the mixer, thus eliminating entirely the wheelbarrow gang. A highway contractor uses a road scraper for grading the subgrade and spreading the stone, saving three-fourths the cost of hand labor on such work.

Syracuse, N. Y., finds that a trenching machine reduces the cost and expedites the work of digging water works trenches and uses its machine for practically all of this work. Erie, Pa., by use of a flushing machine releases twelve laborers and four teams, formerly employed in this work, for use in street construction where more labor was needed.

These few illustrations, among the many that can be found all over the country (those given are distributed from Connecticut to California and from Michigan to Texas), confirm our contention that the scarcity of labor need not cause a material cutting down of the amount of work done, and that it is possible also to perform it with little, if any, increase in cost.

PREPAREDNESS AND ECONOMY.

Appleton County, Wisconsin, secured contracts this year for road work at a cheaper rate per mile and per square yard than it paid for last year's work, according to a statement made by Walter J. Driscoll, the secretary of the County State Road and Bridge Commission. This result it secured by two changes in its procedure. One of these was the purchasing by the county of the material to be used in all this year's contracts. As the county bought in large quantities, it was able to obtain lower prices than could any one contractor buying for his contract only. The other reason for low cost was that this purchasing was done and the contracts let during the winter or early spring when not only were prices lower, but the material could be shipped before the rush of work produced car shortage and while there were plenty of vehicles available, at low rates prior to the beginning of the planting season, for distributing the materials along the line of the proposed work. The early letting of the contract also enabled the contractor to make all his preparations beforehand, engage his foremen, and possibly the laborers also, get his equipment on the ground at his leisure and be prepared to take advantage of the most favorable opportunities presented by the weather for beginning and prosecuting the work.

The county also assisted the work by maintaining an inspector at the gravel plant, by which means they were enabled to accept the material before it was shipped rather than waiting to pass upon it until it had reached the site of the work. Where material is not inspected until it has been delivered, the rejection of it often causes long delays which are more or less costly to the contractor because of the interruption of the work while waiting for shipment of proper material to take the place of that condemned.

In another instance, described elsewhere in this issue, the contractor purchased his own materials, but the contract was awarded in the fall and advantage was taken of the opportunity for delivering material, along the side of the road which was to be improved, by sleighs during the winter and by other vehicles when there was little demand for them, and in this way the contractor was enabled to keep down to a comparatively low figure this item of delivery of material, which sometimes amounts to a considerable percentage of the total cost of the work. By having all of the road metal on hand before work began, also, he was assured that there would be no delay in the receiving of materials, which delays invariably add to the cost of the work, because men either must be worked to less advantage because of such delay, or must be laid off for a few days, with the result that many of them may not return when work is resumed and time and expense may be incurred in filling the gang again to the desired size.

These and other experiences indicate the advantage of preparing well beforehand for road work, and indeed for any work of considerable size. Where it is possible to do so, there are very pronounced advantages in letting contracts in the fall for the work of the coming year. In

addition to those already noted, contractors who are about completing work in the vicinity will frequently bid somewhat lower because they will not then have to remove their plant from the vicinity to their home town and return it to the same locality in the spring, but can ordinarily store it more cheaply in a barn or other building in the neighborhood and avoid the expense of this double freighting.

COMPRESSED AIR IN STREET EXCAVATING.

(Continued from page 108)

A similar compressor operating two jackhammers was used in digging sewer trenches near Tuckahoe, N. Y., and each drill easily put down 100 feet of hole per day. The operating cost was $17.80 per day, which included gasoline, oil, forge coal, and the wages of an operator, two drill runners, a blacksmith and a helper. This makes the cost about 9 cents per foot of drill hole. In another trench-digging job in Greeneville, Tenn., two drills of this kind were operated by a portable compressor run by electric motor. Electric current cost 2 cents per kilowatt, or about $1.25 a day, and if we assume the same labor cost and drilling speed as above the cost per foot of hole would be about 8 cents.

There are some cases in which it seems to be economical to dispense with the compressor and use the steam direct. For instance, where a steam shovel is used, steam can be brought direct from the boiler through comparatively short lengths of hose and be used to operate the

PNEUMATIC TAMPERS AT WORK.

drills directly at possibly less cost than if a compressor were used. The drills referred to above can be operated directly by steam in this way as well as by compressed air.

Not only in excavating trenches, but in back-filling them also the air compressor can be used to advantage. Pneumatic rammers for trench tamping are said to give results superior to hand work, as the pneumatic rammer strikes 600 blows per minute and with more than twice the pressure exerted by a man working by hand, who can deliver only from 30 to 50 blows per minute. The pneumatic rammer is a reciprocating machine in which the extended piston rod carries a suitable butt for compacting the earth. The cost of pneumatic tamping under average conditions has been found to be about 7 cents per cubic yard, while hand tamping frequently costs two or three times as much. The same amount of tamping can be done with about one-half the number of men when using the pneumatic tamper.

USE OF ROAD SCRAPERS.

Some saving of labor, and at times a very considerable saving on road construction work, could be effected by the wider use of a road grader or scraper, according to John H. Gordon, a contractor of Albany, N. Y. Said he in a recent letter to Municipal Journal: "Few grade foremen on our work understand the use of these machines. At times they use them for trimming shoulders, but rarely otherwise. The town superintendents throughout the state are more familiar with their use and do much grading with the heavier type machine drawn by a road roller or a traction engine. Last season I hired a man who had been working on the county roads, and he was able to do effective work with such a machine at one-quarter the cost of hand labor.

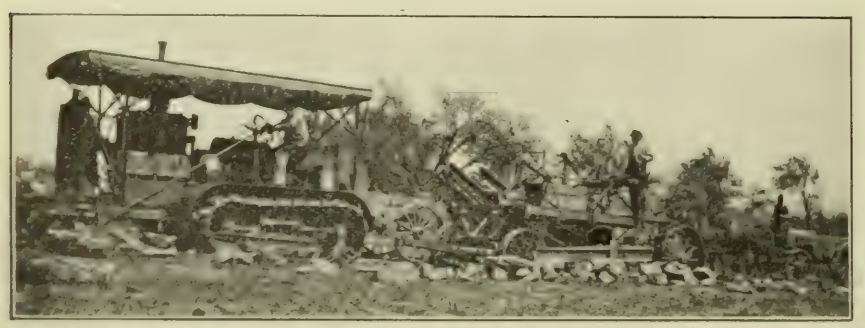
"The Fresno also is a useful tool when properly handled. It is rather hard on horses, but with two teams it could do much of the work of fine grading that is very generally done by hand.

"Many contractors still mix their concrete for culverts by hand, but a small concrete mixer will save half the labor on such work."

THE CATERPILLAR IN ROAD WORK.

Caterpillar tractors were used to a considerable extent for hauling material along the Los Angeles aqueduct where there were no roads, or only poorly graded ones; and the same principle has been employed for the running gear for certain trench diggers and for other machinery used on uneven ground. A further use has been developed in road construction work. For instance, a gasoline caterpillar tractor has been used for several years by the city of Pontiac, Mich., which hired it from a contractor of that city, and finally last year the city purchased one. It uses it in grading streets as well as hauling gravel and crushed rock for the surfacing of main roads extending out of that city. George Brown, commissioner of streets, gives the following particulars of the operation of this tractor on one piece of work, the figures being averages: Four trips a day hauling 13½ yards 2 miles each trip, or 54 yards a day. 35 gallons of gasoline used at 17c., 6 quarts of oil at 10c., and 4 quarts of oil at 6¼c., giving a total cost for materials of $6.80. An operator at $4.00 ran the machine, making a total cost per day of $10.80. This gives a cost per yard mile of 10c., no overhead charges included.

A similar machine is used by the city of Montgomery, Ala., and they state that it is doing the work of from 14 to 16 teams. The operating cost, including the operator and allowing for depreciation and upkeep, is approximately $20 per day. In Kansas City, Mo., contractor H. H. Hanenkratt uses the same appliance for pulling an elevating grader, instead of using a number of teams of horses or a road roller.



CATERPILLAR DRAWING ELEVATING GRADER.

The WEEK'S NEWS

State Road News in Maryland and Idaho—Housing and Health in Milwaukee and Rochester—Hetch-Hetchy Progresses —New York to Celebrate Catskill Water—New Jersey Cities Fight Gas Standard Reduction—Indiana Cities Oppose Surcharge for Electricity—Atlanta's Conflagration Explained by the Underwriters—Fires in Harrison, Ida., and Rochester, N. Y.—Flood Protection Upheld in Court—Progress on New York City's Zoning Law—Race Segregation in McAlester.

ROADS AND PAVEMENTS

City Wins Assessment Case.

York, Pa.—The right of the city of York to assess the cost of street paving upon abutting owners was upheld by the state superior court, when decisions were rendered affirming the rulings of judge Ross in the test cases. The litigation was the result of a concerted action by several hundred property owners who resisted the collection of the street paving assessment upon South Queen, South Pine, East King, West College avenue, West Philadelphia, East Princess and several other streets. That they are not yet prepared to accept the action of the superior court, and that they are advising property owners against whom the city has filed liens not to make payment until a final decision has been reached, was the statement made by attorneys for property owners. It is possible that an appeal to the supreme court may be made. The paving suits will establish a precedent for third class cities in the state. Counsel for the property owners declare that it is perfectly clear that the opinions can only affect owners of property which abuts on streets which have never been improved before the present paving. In 1915 the city filed liens against property owners on North Hawthorne, East Princess, and other streets for the payment of paving assessment. Petitions were filed to strike off the liens, the rule was discharged, and the cases brought to trial in the York county court. Abutting property owners maintained that with the exception of Hawthorne street, the improvements made in 1914 was not original paving but a repaving and therefore not liable to assessment. Judge Ross decided that the counsel for the property owners did not present sufficient evidence in support of their contention to allow the case to go to the jury, and gave binding instructions in favor of the city. The property owners then appealed.

Road Commissioner Objects to Reciprocity.

Baltimore, Md.—Frank H. Zouck, chairman of the state roads commission, has addressed a letter to the Maryland senators and representatives protesting against a pending bill which would establish reciprocity between Maryland and the District of Columbia in the issue of automobile licenses. This would mean that all automobile owners in the District could use the improved roads in Maryland free of charge, while Maryland owners would have the same privilege in the District. This would mean an annual loss by Maryland of over $90,000, and as Mr. Zouck says, would be an entering wedge to other reductions. In his letter Mr. Zouck says in part: "Last year we received from Washington licenses $86,988.76 for pneumatic-tire vehicles and $3,088.50 for solid-tire vehicles or trucks, making a total of $90,077.26. We shall expend $100,000 this year in maintaining the roads in the two counties bordering on the District of Columbia and the Washington Boulevard. The money received from the automobile licenses is the only money which we receive to maintain our state road system, the legislature of 1916 having removed the one cent state tax, which was formerly applied to the maintenance of state roads. If we are to be deprived of the revenue collected from the Washington cars, it will seriously embarrass this commission. When the one-cent state tax was removed it was thought that the revenue from the automobile licenses would amount to sufficient to take care of our maintenance, but we find that we are running behind at the rate of about $100,000 or more per year, and if the Adamson Law goes into effect it will increase our deficit another $100,000, making a total of $200,000 or more per annum. In view of the increased cost of material, labor, etc., and the increased amount of traffic which will pass over our roads because of the war it will be utterly impossible for us to maintain our roads as we have in the past. Maryland has reciprocity with every state and territory within the United States, which extends to our state the same privilege and the use of their many miles of roads, but we think it is unfair to allow the same to the District of Columbia, which has only a small number of miles of thickly traveled streets to offer in return. However, any member of Congress or temporary resident of the District of Columbia who has complied with the automobile laws of his own state may use the Maryland roads unmolested by displaying his home license. The taxpayers of Maryland have willingly contributed the $24,000,000, including the $5,000,000 spent upon Baltimore city streets and the Hanover street bridge, which has been necessary to complete its modern system of state and state aid roads, but with our maintenance cost, as well as our maintenance deficit increasing and with our tax rate increasing each year, it is doubtful, to my mind, whether they will allow the deficit to mount higher and higher, as it will do if we are not to receive the revenue derived from the District of Columbia."

State Will Not Maintain Volcanic Ash Roads.

Boise, Idaho.—The state highway commission has officially gone on record in favor of graveled roads through the lava ash solid formations of the Snake river valley. The action taken by the commission is expected to result in the graveling of the North and South highway, the Sawtooth Park highway, the Idaho & Pacific highway and the Yellowstone Park highway at points where the natural materials through which the roads are built will not sustain a heavy traffic. "The commission has acted in self defense," said William A. Broadhead of Mackay, its chairman. "We have been criticised for spending too much money in grading roads that go to pieces during the hot summer months and again in the winter. The cost of keeping the highways in shape is too great and far out of proportion to the original cost of constructing them." E. M. Booth, state highway engineer, in submitting to the commission figures on the cost of constructing and maintaining the roads under the supervision of the state, said that of $1,000,000 spent on the highways since the creation of the commission, $600,000 had been used in grading and that $100,000 had been expended in maintaining the dirt road built. The commission agreed that the several counties of southern Idaho through which the state highways pass will be given until July 1, 1918, in which to finance the cost of graveling roads kept up by the state. In the event that the highways are not surfaced, the state will not maintain them. Counties now engaged in building highways that are to be maintained by the state will be given a year after the completion of the roads in which to gravel them. The highway engineer announced at the meeting that the state is spending 20 per cent annually in keeping them in condition. Afterward he said that the money expended for maintenance purposes did not keep the roads in shape for travel more than four or five months out of the year. According to the highway engineer it is costing on an average of $1,500 a mile to surface the state highways. It costs about the same to establish and grade a road through the Snake river valley. The

commission expects to ask but few of the counties in northern and central Idaho to hard surface the state highways that cross them since it is claimed that the natural formation of the earth roads in both the Panhandle and the Salmon river country is strong enough to bear a heavy traffic. According to the highway commissioners and the highway engineer the roads maintained by the state through southern Idaho are in bad shape at this season of the year where they are not graveled. "The dust is so deep and the roads have cut so bad in the Twin Falls country that it is almost impossible for a farmer to haul a heavy load over them," Booth said. "The highway department spends money in grading up and putting a crown on the dirt highways early in the spring and when July and August pass the roads have been torn to pieces and nothing remains of them but a streak of dust. We rebuild them in the fall and when winter comes the highways are nothing more than streaks of mud across the plains. That makes them unfit for use more than half the year."

Road-Building in Japan.

Tokio, Japan.—Little attention has been given to the subject of road building in Japan up to the present time. The universal practice has been to haul ½ to 1 inch stone in handcarts to the spot needing repair, sprinkle a thin layer over the road, and let the traffic do the rest. Some of the bridges are not strong enough to support an ordinary touring car, and the roads, where they pass through towns and villages, are often so narrow that all available space is occupied by an automobile, making progress extremely difficult. The complaints of automobile owners and the results of a trial trip made by the commissary motor trucks of the Japanese army have evidently convinced the authorities that something should be done to better conditions, and it is reported that the Department of Internal Affairs intends to widen the roads, although nothing has been said about improving the surface.

SEWERAGE AND SANITATION

War Department Helps on City Sewer System.

San Antonio, Tex.—To insure the delivery of machinery required by the city for the construction of the Sherman street sewer pumping plant the order will be placed through or directly by the War Department. The construction of this plant is necessary for the operation of the sewer system at Camp Travis, where cantonments for the National Army are now in course of construction. The plant, which will cost approximately $30,000, is to be built and operated at the expense of the city, but on request of the government. When the city built the sewer pumping plant at the Concepcion Road, in the south part of the city, it was nearly a year after the order was placed before the pumps arrived. It is felt, however, that, backed by a government order, the necessary pumps can be obtained almost on demand. Work on the construction of the building will start at an early date, according to Commissioner Heuerman. Rapid progress is being made by the government in digging the trenches and laying the sewers. There are five big trenching machines at work, and some of the trenches are forty feet deep, to accommodate the gravity line to the proposed Sherman street pumping plant. The total length of the sewer necessary to afford facilities for the cantonments will not be less than fifteen miles. The expense of laying this sewer is to be borne by the government.

Housing Conditions in Milwaukee.

Milwaukee, Wis.—The health department has published a report on its investigation during the past year of housing conditions in the city. The report finds that about twelve per cent. of the city's population—or about fifty thousand people—are living under conditions which are generally recognized in the term "housing problem." The report emphasizes the striking fact that these poor housing districts, with only 12 per cent. of the city's population, furnished over one-fourth of all deaths from tuberculosis and 21 per cent. of the entire mortality under five years of age for the year 1915. Recommendations urged include increased power for investigation and regulation of the one and two family house, which at present cannot be adequately reached, and also a change in the present definition of lodgers or boarders dependent upon a specified minimum requirement of air space per person, and the licensing of such lodging houses. It urges more fundamental measures, including the improvement of property by the application of the single tax principle and also suggests consideration of municipal lodging houses. The housing problem is not confined to one district, thirteen out of the 25 wards in the city having poor housing. More than 623 acres, or 3.7 per cent. of the entire city area, are covered in the poor housing districts. It is pointed out that since at least one-half of this area lies in districts of high land value, the economic loss to the community through non-improvement of the property and the consequent inadequate taxation, is considerable. The report draws attention to the "remarkable coincidence of the reported cases of tuberculosis in the city at the present time to the districts that have a recognized housing problem." From the records of the Juvenile Court, it is found that fully 30 per cent. of the cases came from the poor housing districts. It is reported that 34 per cent. of all houses in these districts have features "intrinsically inimical to the life and health and good morals of the occupants. Fully 44 per cent. of the conditions found cannot be reached under the existing housing laws," says the report. It is pointed out that bad housing is probably a contributory cause in the case of tuberculosis, infant mortality, juvenile delinquency and other vicious social conditions. The various factors primarily responsible for bad housing in each case are summarized as follows: The occupant as chief cause, 23 per cent; the house as chief cause, 35 per cent.; insufficient housing laws, 44 per cent.; overcrowding, 50 per cent. The remedies proposed are education and legislation. For immediate correction stricter enforcement of the tenement house law; extension of the laws to include the two-family house and municipal lodging houses are urged. Dr. George C. Ruhland, commissioner of health.

Court Decides Against Sewer System.

Hammond, Ind.—The intercepting-sewer system planned for this city will not be built, the state supreme court having rendered a decision against it. The court objected to the method of special assessment. Contracts totaling about $800,000 were let in 1913, but no work has been done. The system was planned to discharge into the Calumet river and through this and the Sag channel into the Chicago drainage canal. It is reported that the plans will probably be renewed on some more acceptable basis.

To Reduce Housing Congestion.

Rochester, N. Y.—Better housing conditions in Rochester is expected to follow the passing of an ordinance by the Common Council, restricting the building of three and four-family houses on small lots. That Rochester is tending toward unnecessary congestion in the construction of its dwellings is the belief of the law committee of the common council, which recommended an ordinance that will eliminate such in the future. The ordinance defines what shall constitute a tenant house. Three and four-family houses must hereafter be constructed under the regulations governing tenement houses or must be placed on lots of not less than 60 feet wide and 100 feet deep. Another measure adopted further restricting the building of structures designed for human habitation, provides that a tenement house must front on a street and no building shall be constructed between the street and the tenement house. This ordinance also prohibits the building of any houses on lots occupied by buildings erected under the tenement house restrictions, unless the lot on which the tenement house is built reaches to another street.

City to Fight Mosquitoes.

Columbia, S. C.—At a joint meeting of city council and the city board of health an appropriation of $3,000 was made by the city to be used in a fight to eliminate malaria by destroying the breeding and "resting" places of the malaria conveying mosquitoes. The work will be carried on under the direction of the board of health, which will be augmented

by five additional health inspectors, who will be employed for two months. Direction was also given to the superintendent of the street department to do certain ditching deemed necessary by J. A. LaPrince, sanitary engineer, United States public health service, who has been making a sanitary survey of the city and surroundings. This work will also be done under the supervision of the health department. It is expected that an ordinance will be introduced making it unlawful for persons to maintain pools of water in any form, tanks or otherwise, unless they are screened. "There are numerous breeding places of malaria conveying mosquitoes both in the city and in the county close to the city limits, and about 30 miles of ditches and streams favorable to anopheles production," says the report that Mr. LaPrince submitted to the city council As the arrival of laborers from malarious districts is now greater than in previous years, it is essential that the proposed work for mosquito control be begun at once, otherwise there may be many cases of malaria contracted in Columbia and it will be an undesirable place for the United States troops to visit. The county and city should also arrange for the lowering of the water level in the channel of Gills creek, below Garner's Ferry road. It is essential that Hampton mill pond marsh be drained, but no outlet for drainage is yet available. At the present time thousands of anopheles larvae are present in the Gill creek valley near the cantonment. The military authorities can not drain their land until an outlet is provided. The present conditions there are a serious menace to health."

WATER SUPPLY

Progress on Hetch-Hetchy.

San Francisco, Cal.—More than $6,000,000 is involved in the construction of the tunnel aqueduct in the mountain division of the city's Hetch-Hetchy water project, plans and specifications for which have been transmitted to the board of public works by the city engineer. Bids for this unit of the project will be received by the board on August 22. For convenience, the aqueduct is divided into three sections; its aggregate length is a little over eighteen miles. The tunnel, of concrete, will be ten feet three inches high and of the same width. Work must commence in seventy days from the time the contract is awarded, and must be completed in approximately three years and four months. The estimated cost is $6,200,000, and a bond of $700,000 will be required of the contractor. This is one of the largest, though not the largest, units of the Hetch-Hetchy work. Another tunnel, thirty miles in length, is yet to be run through the Coast Range of mountains to bring the water to San Francisco.

County and Water Company Agree on Assessment.

Oakland, Cal.—The Spring Valley Water Company and the county of Alameda have arrived at an agreement concerning the company's future assessments here and the agreement has been ratified by the board of supervisors meeting as a board of equalization. By the new terms, the Spring Valley Water company will be hereafter assessed $1,500,000 on its riparian rights, as against $3,000,000 heretofore, the company agreeing to drop its six lawsuits against the county for previously alleged over-assessment. The company further agrees to pay the Alameda county water district $3,889.50 for a "tax inadvertently not made" at the last assessment. The new agreement is satisfactory to all parties concerned.

Metering Schools to Stop Waste.

Lawrence, Kan.—Free water to the city schools will be discontinued this fall, E. H. Dunmire, city engineer, has informed the board of education. Meters will be installed on services leading to all buildings in the near future and the regular monthly bill will be presented to the board of education. The rate to be charged is that fixed by city ordinance. E. B. Cronemeyer, clerk of the board, points out that charging the board for water used in the school buildings is causing additional burden on the taxpayers who are already paying for the maintenance of the water works and for the maintenance of the city schools. It is possible, Mr. Cronemeyer points out, that the school levy may have to be increased while the money is really going into another pocket—that of the water department of the city. In his letter to the board, Mr. Dunmire, head of the water department, says it is the desire of the water department as far as possible to have all those using water pay for it and thereby make the rates equal to all parties. Answering the representatives of the board when they objected vigorously to the plan, superintendent E. H. Dunmire said that the two important considerations were: 1. Preventing waste of water, which is a dead loss to the people. 2. Making every city department show financially just what it costs. "Free water and economy can't be found together," said Mr. Dunmire. "Besides, there isn't really any such thing as 'free' water. It costs something to pump and deliver every gallon. The school board may get water for nothing, but the city doesn't get it for nothing."

To Celebrate the Catskill Aqueduct.

New York, N. Y.—According to a preliminary report issued by the mayor's committee on Celebration of the Completion of the Catskill Aqueduct, the festivities will begin at the city hall on Columbus Day, October 12, and continue for two days. The committee, of which George McAneny is chairman, says that this piece of municipal work rivals in magnitude the construction of the subways. The original plan was to have the celebration early in June, but on account of the war the date was changed. A feature of the celebration will be an artificial waterfall from one of the East River bridges. A high pressure perforated water pipe will be laid clear across the river span, and the waterfall produced by this means. The water will be turned into this pipe on the evening of Columbus Day, and if necessary river traffic will be stopped. Former mayor McClellan, under whose administration ground was broken for the aqueduct, will be the guest of honor at the ceremonies in the city hall on October 12, when the new water system will be formally turned over to the city. At the conclusion of this ceremony a fountain in City Hall Plaza, made by Frederick MacMonnies, and presented by the late Angeline Crane, will be unveiled. In the evening a dinner will be held, at which mayor Mitchel will preside and bestow medals upon those who have done the great work. On the second day of the celebration there will be a civic parade, including members of the water supply commission, representatives of the contractors, workingmen and apparatus used in the construction of the aqueduct. The program also includes an allegorical pageant, to be given in the stadium of the City College.

STREET LIGHTING AND POWER

Gas Standard Reduction.

Trenton, N. J.—Increased costs in the production of gas during the past three years and the needs of the United States government for by-products of gas required for the manufacture of high explosives were two of the principal points urged before the board of public utility commissioners in the course of the argument upon the application of the Public Service and other gas companies for a reduction in the present standard of gas fixed by the board. The additional point was made that the proposed reduction in the heating standard of gas would not act injuriously upon the consumer, since the practical effect of the lower standard would be better service and greater efficiency in the use of gas, so that in effect the consumer would pay slightly more for a better service than is now possible. These arguments, advanced by L. D. H. Gilmour, counsel for the Public Service Gas company, were opposed by George L. Record and city counsel Spaulding Frazer of Newark, representing the municipalities opposing the lower standard. The concrete proposition of the gas companies was that the present minimum of 600 British thermal units required in gas be reduced to 550 units. Mr. Gilmour said that when the present standard was adopted it was practically unopposed by the gas companies because the relation between the cost of production and the price paid

by the consumer was a reasonable one. He stated that for the year 1913 the production cost for gas manufactured by the public service was 23.27 cents and burner cost was 54.19 cents. For the first five months of the current year he said, the production of cost in all divisions was 31.55 and the burner cost 62.31 cents, showing an increase in production cost under present conditions of 8.28 cents per thousand cubic feet, since the price of ninety cents was fixed.

"It will be readily seen," continued Mr. Gilmour, "that since 1913 conditions have materially changed throughout the United States and have affected gas companies everywhere. The relation between the cost of material and the price of the manufactured product is essentially different. The market price of gas oil has increased from three cents to something over six cents, making a difference, roughly, of twelve and a half cents a thousand feet in the cost of the manufactured gas in the holder. The price of gas coal has increased very materially and the difficulties with which the high grade gas coal are obtained makes it almost a necessity to use lower grades in the manufacture of gas."

The condition of the industry today is such that to conserve the resources of the country it is, or soon will become, necessary in the production of gas to use lower grades of coal than have heretofore been used for that purpose, and these lower grades of coal will not produce, without expensive enrichment gas of the calorific standard which the rules of this commission require."

Mr. Gilmour said the war has created an imperative demand for certain products which to a large extent have been allowed to remain in illuminating gas produced in this country, and has been consumed in the burning of the gas. These products, toluol and benzol, and the recovery of them, has become important in connection with the manufacture of high explosives. The recovery of toluol and benzol will diminish slightly the calorific value of the gas.

Reviewing the evidence submitted in behalf of the Public Service Gas company, Mr. Gilmour said they showed a gross income for the five months of 1917 of $4,901,468.94, as compared with $4,469,129.19 in 1916, and $4,036,579.71 for 1915, an increase for 1917 over 1915 of $864,889.23.

"These figures taken alone," continued Mr. Gilmour, "would indicate a healthful growth in business, but when we deduct from the income account the costs, as increased by higher-priced material and higher labor, we find the net result of operations for the first five months of the year in 1915 was $115,140.25; in 1916, $183,979.77, and in 1917 a loss of $70,429.27, showing a decrease in net earnings for five months in 1917 from 1916 of $254,409.04, and from 1915 a decrease of $185,569.52."

At the outset of his argument for the municipalities, Mr. Frazer challenged the companies to demonstrate that the proposed decrease in heating units would not materially affect the consumers. The companies' plea for a display of patriotism he described as throwing a little sand in the eyes of the consumer. He said they can get all the toluol needed and still maintain the present standard. This, he added, is now being done by the Public Service at its plants in Newark and Camden. He said that if the government's need for the by-products of gas was as urgent as claimed by the companies, the people would willingly make a sacrifice, but asserted that such is not the case. Mr. Record in opposing the move for a lower gas standard said: "As the case stands on the record, there has been nothing proved which would enable this commission to render any other decision than one dismissing the application.

"Under the laws, the commission can only change the standard from consideration of public interest. In this case there has been no proof whatsoever of any public interest that would be subserved by the change in the standard. It has, however, appeared both by the admissions of all of the witnesses of the gas companies, as well as by the testimony of the engineer employed by the commission and by the testimony of experts employed by the municipalities, that the changing of the standard applied for by the gas companies would make a substantial lowering of the lighting and heating powers of the gas supply, and that the cost of manufacturing the poorer quality of gas would be materially reduced by the company.

"From this proof it is apparent that, granting the company's application would compel the gas consumers of this state to use more gas of a poorer quality, and therefore would operate to increase the gas bills of every gas consumer of this state; while at the same time it would lessen the cost of manufacture to the company. The company would, therefore, obtain more money from the consumers for a very much inferior quality of gas. If such an application was granted, everything that was gained for the public by the Passaic gas case would be lost—and more, too.

"No proof was offered that there is not a sufficient quantity of these chemicals for all of the government and other uses already in the market. The testimony is undisputed to the effect that the market price of toluol has remained at its present price for about a year and a half, which is a plain indication that such demand as there is is now being supplied.

"In my judgment the commission has no power to grant a change of the standard without changing the price, and it cannot change the price unless it investigated all of the conditions under which the companies are now doing business, and determine what would be under the new conditions a fair return. If this task is undertaken, it is nothing more or less than a rate case and must be gone into most exhaustively by the company and by the municipalities and by the commission. There is no pretense on the part of anybody that there is in evidence in this case any proof upon which the commission could fix a just and reasonable rate."

Commission to Investigate Rate Increases.

Harrisburg, Pa.—The public service commission will shortly take up the new question created by gas, light and fuel companies of the eastern part of the state which recently began adding to their bills a seventy-five cent overhead charge or a "ready to serve" charge. Complaints have been filed by the boroughs of Morrisville, New Hope and Newtown against the Bucks County Public Service company, which furnishes gas, heat, power, light and fuel to the residents of some of the Bucks county towns.

Cities Oppose Electricity Surcharge.

Indianapolis, Ind.—The Indiana public service commission has held that there is doubt concerning the right of the Indiana Electric Light Association to petition on behalf of its members for a 30 per cent surcharge on all bills to their consumers and that each company desiring relief should file its individual petition independent of the association. At that time there will be a general inquiry into the abnormal conditions which the companies assert have brought about the necessity for a temporary increase in rates. It is presumed that the subject matter of the petitions will be identical, following in spirit the petition of the Indiana Electric Light Association, which urged that the increased price of coal and other materials made it necessary for the companies to have more revenue. The question of the jurisdiction of the commission in hearing the petition of the association, as a committee of companies, was raised by William A. Bond, city attorney of Richmond, appearing on behalf of all the cities affected, who contended that the commission could only take up the case of each company individually. In closing the argument, Mr. Bond called attention to the fact that no public owned electric utility had asked for an increase in rates. The attorney declared that the utility companies should not contend for "their pound of flesh and drops of blood" at this time, when everybody is having to make sacrifices on account of the war. C. N. Thompson, representing the Indianapolis Light and Heat Company, argued to the commission that it had the right under the statute to proceed with the hearing under the petition by the association because of emergency. A representative of the Northern Indiana Gas and Electric Company announced that its company would not ask the commission for rate increases in cities where the rates are definitely fixed by franchise.

Mr. Bond appeared on behalf of the many cities to be affected, having been chosen for this purpose by a committee of city officials appointed at a recent meeting of the Indiana Municipal League. The question of jurisdiction raised by Mr. Bond is one of wide importance, as the decision of the commission in regard to it will also have a direct bearing on petitions now before the commission for increases in rates charged by the gas companies and the railways doing business in the state. The Indiana Gas Association is now a petitioner before the commission on behalf of its members for permission to make a surcharge of 25 per cent and also to make a reduction in the heat standard of the gas produced. The railways doing business in the state are also joint petitioners for permission to charge a 15-cent increase on each ton of coal hauled. The indications are that the commission will proceed with the hearing of the general issues raised by the plea of abnormal conditions, with the understanding that the petitions shall be so altered that entries of the decisions of the commission may be made separately in regard to each individual petitioning company. A number of companies withdrew from the petition in order to thresh out the question with the cities out of formal hearings. Mr. Bond said the word "surcharge" was significant, as "it means something extraordinary, an extra load, an inequitable charge." "Why have some of these companies withdrawn?" he asked. "Perhaps it is because they are not entitled to any relief." William J. Wood, of the commission, asked Mr.

Bond whether he did not think the commission had the right to formulate rules and have a hearing on general conditions that were applicable to all the petitions concerning which the commission's decisions could be entered separately. Mr. Bond did not think this should be done. Mr. Wood indicated that in his opinion such a question as the "outrageous" prices charged for coal could be taken up, as it affects all of the petitions as coal consumers. Mr. Bond said he thought each petitioner should stand alone in the case in order that he might have the opportunity to make an appeal to the courts should he not be satisfied with the decision of the commission.

Richmond, Ind.—Earnings of the Richmond city light plant amounted to approximately twelve per cent on the investment during the fiscal year ended June 30, despite the fact that the cost of production has advanced ten per cent., according to a report by superintendent Kleinknecht. Both he and president Bavis, of the board of works, declared that the Indiana Electric Light Association, composed of light companies operating in forty cities in the state, which has petitioned the state public service commission for authority to raise their rates thirty per cent is taking advantage of present conditions. Richmond will not be affected by the ruling of the commission, but as all of the cities affected are members of the Municipal League of Indiana, Richmond city officials are pointing out the record of the municipally-owned plant here. The electric light association, in its petition filed before the service commission, claims that general operating expenses have advanced from 45 to 50 per cent due to high prices of materials used in the manufacture, and particularly coal. Superintendent Kleinknecht estimated that general operating expenses of the local plant have advanced ten per cent. After allowing $18,000 for depreciation and $10,000 for taxes, thus putting the plant on the same basis with a privately owned plant, the earnings would still be far in excess of the amount allowed privately-owned plants by the public service commission.

FIRE AND POLICE

Underwriters Report on Atlanta Conflagration.

Atlanta, Ga.—The city has apparently learned the lesson of the conflagration of May 21, according to a report on the fire by the National Board of Fire Underwriters in New York. The underwriters point out that in their report on the city made in 1909, the statement was made that "in the shingle-roofed frame residential section there is always a high conflagration hazard," and again in 1914, the conclusion was drawn that "the frame residential sections with shingle roofs possesses the hazard of flying brand fires to a pronounced degree." To better conditions in 1916 an ordinance was passed regulating roof coverings, but it was not to go into effect until July 1, 1917. Before this the conflagration came and justified the underwriters' warnings. The fire devastated a total area of about 300 acres and began by sparks carried from a shingle roof to others. The total number of buildings involved was 1,938, of which 47 were brick and 1,891 frame. Classified by occupancy there were 1,537 dwellings and apartments, 42 mercantiles, 351 garages and outhouses and 8 miscellaneous occupancies, including churches, schools, special hazards and warehouses. Of the total number of buildings, 1,682, or about 80 per cent., had shingle roofs. It is estimated that the total property loss was about $5,700,000, of which about $3,500,000 was covered by insurance. Extensive damage was done to the trolley wires, feeders and poles of the street railway system, amounting to approximately $125,000, and probably a like loss was suffered by the telephone company. The direct expense of the city was heavy; approximately $20,000 of hose was destroyed, and the cost of bringing outside aid will be considerable. About 10,000 persons were made homeless, and many, particularly negroes, lost everything they owned. The report describes the fire in detail from its outbreak until it was extinguished. All conditions are accurately recorded. A remarkable series of views is presented showing how the fire swept the city. Among the conclusions drawn by the underwriters the menace of the shingle roof is emphasized and it is pointed out that a shift of wind during the fire may have caused the high value business district to be involved. The fire chief and the department are commended on their good work. The report urges motorization of fire apparatus. The report says that the fire emphasized the need of a large supply of hose and suggests the purchase of 350 feet per company per year. The value of high pressure was demonstrated. Although necessary boiler and pump capacity has maintained, a reserve would have been desirable in case of accident. There is a need of adequate arrangements for the handling of telephone alarms. "Improved streets are of material value in a conflagration of this kind, as in many sections the unimproved ones made long detours necessary for the apparatus," says the report. Following the fire the council passed an ordinance controlling roof coverings. All buildings, except dwellings, frame buildings and buildings not exceeding two stories, or 30 feet in height—and 2,500 square feet in area, and not used for factories, warehouses or mercantile purposes must have roof coverings of standard quality, such as—(a) brick or concrete surface, (b) clay or portland cement tile, (c) tin or slate, (d) asbestos shingle ⅛ inch thick or thicker, (e) pitch or felt, built-up type, four or five plies, gravel or slag surface, (f) asbestos-asphalt, built-up type, four or five plies, smooth or grit surface, (g) other types of covering having equivalent fire-resisting properties, approved by the committee of consulting engineers. All the buildings excepted may be covered with the same types of roofing or with asphalt-rag-felt prepared roofing or asphalt-rag-felt shingles. The top and sides of dormer windows must be similarly covered. If a wood shingle roof is damaged by fire more than 20 per cent, the entire roof must be replaced with one of the specified materials. If a wood shingle roof is replaced for cause other than fire damage more than 10 per cent in any one year, it shall be entirely replaced with the proper materials. The building inspector is given the power to condemn and have removed any wood shingle roof that in his opinion is in such deteriorated condition as to be excessively inflammable. Within twelve years all wood shingle roofs must be replaced by proper coverings.

Half of Town Destroyed by Fire.

Harrison, Ida.—Thirty-seven residences and all except six business buildings in this town were in ruins as the result of a fire originating in a lumber mill. Half the town was wiped out and the damage was estimated about half a million dollars. A boatload and a carload of provisions were sent from neighboring towns, and a trainload of tents, provisions and bedding was sent from Spokane. Arrangements were made to accommodate those rendered homeless by the fire at the two hospitals, the hotel and the residences left standing, and in the tents. The fire was caused by a spark from an engine. There was no water to fight the fire and no fuel to run the water plant. The state gave the city $1,000 with which to restore order.

$100,000 Fire in Grain Elevator and Warehouses.

Rochester, N. Y.—Headed by chief Joseph M. Quigley, the police are investigating the fire which completely destroyed the Whitney elevator and warehouse and a number of warehouses. The damage amounted to over $700,000. Chief Little, who took personal charge of the work, stated that it was the hottest fire he had ever experienced. When the fire was at its height 11 engines were pumping water through more than 30 lines of hose. The flames soon worked through the roof of the elevators and spread to the cupola of a malt house. A strong north wind at the time caused the flames to sweep in the direction of small dwellings. A series of small explosions endangered the work of the firemen. After the fire had been raging for an hour and a half, the heavy sheet iron, which encased the exterior of the building, sprung loose, after being warped by the intense heat, and dropped to the street. Several firemen working close by the building at the time had a narrow escape from perhaps fatal injury. The iron fell onto one of the hose lines, cutting it in two and rendering it worthless. As the fire raged on, more pieces of

apparatus were summoned by chief Little. Soon a heavy metal chute, weighing three tons, and used to convey grain, fell with a crash. A short time after the water tower had been summoned, and was placed in position, Lase J. Akey, acting superintendent of the fire and police telegraph, discovered that it was within two inches of two high tension electric cables, carrying 42,000 volts. Had it at any time touched the wires anyone on the machine, or anyone touching it, would have been killed instantly. The cables were order cut. It left the entire district in darkness, except for the glare of the fire. Some of the firemen first to arrive took up a position on the roof of the west elevator. Beneath them the framework was afire. They kept up a steady stream of water into the east elevator until their attention was called to their danger by onlookers from the street. They had just taken to the extension ladders and reached a place of safety when the roof on which they had been working collapsed, taking with it several lines of hose. This followed the collapse of the east elevator.

MISCELLANEOUS

Conservancy Court Upheld.

Dayton, O.—The court of appeals has given an opinion holding as groundless various technical claims, and affirmed the Miami conservancy court in every particular in the error proceedings instituted against it. In the opinion of the court of appeals the decision of the judges of the conservancy court as to the question of the navigability of the Miami river, the right to sit at Memorial hall instead of at the courthouse, constitutional and jurisdictional questions and handling of the bill of exceptions were upheld in every part. Referring to the constitutionality of the conservancy law and the jurisdiction of the conservancy court, the court of appeals, in a written decision, states that these matters have been reviewed and decided by the supreme court of Ohio against the contentions of the plaintiff in error. The court further states it has examined the record with reference to each and every error assigned, and that it has found no error that would justify a reversal of judgment.

New York Zone Law in Courts.

New York, N. Y.—A decision bearing upon the effect of the building zone law on the purchase of real estate was made by supreme court justice Hotchkiss when he held that the law does not constitute an incumbrance on property such as to relieve purchasers from an agreement to take title. The question was raised in a suit of the Lincoln Trust Company to compel the Williams Building Corporation to take a parcel of land. The defendant had agreed to buy the property for $50,000 last August, after the building zone law had been passed but before the defendant had knowledge that the law would prevent the erection of a business building on the property. After paying $2,000 down the defendant refused to make further payment, on the ground that since the location is restricted to dwellings it is no use to the defendant. The defendant contended that the property was to be sold free of incumbrances, and that the building restriction is an incumbrance. Justice Hotchkiss said in his opinon: "Although the zoning law undoubtedly operates to restrict the unqualified use of the premises, it does not constitute an incumbrance within the meaning of the contract. It is rather in the nature of a governmenal regulation, subject to which all property is held and all contracts and conveyances made." The zone law has been in the courts in a number of minor cases. Interest is centered on the test case which will be taken up to the supreme court. One case reported draws a distinction between the building laws and the regulations. An attempt to appeal from the restrictions of the regulations was rejected because it was not an appeal from the action of the building department, which has exclusive jurisdiction, including the zone regulations. That is to say, the decision was upon procedure, not upon the merits of the appeal or the validity of the regulations. The action must be taken through the superintendent of buildings, and not over his head or in neglect of his authority. Another case dismissed a proceeding brought by a private party under the zone regulations, because he had no special grievance. The regulations are for public benefit, and must be enforced either by the city or by some one showing special injury. In other words, the regulations cannot be made the vehicle for private actions which might prejudice the regulations themselves. In all cases the city must have opportunity to support the regulations as an interested party. Otherwise the regulations might be attacked, perhaps invalidated, by litigations for that purpose, rather than for the protection of public interests. The law has the backing of the real estate associations and civic and commercial bodies and there appears no doubt that the measure meets with enlightened popular approval. An example of its acceptance by influential forces in the city is the publication of the Lawyers' Mortgage Company of a complete guide to the law and its history and applications. The volume is illustrated with splendidly prepared maps and sells at $1 a copy. Meanwhile the Board of Estimate and Apportionment has published a cloth edition of the final report of the Commission on Building Districts and Restrictions with appendices. It is being sold by the Committee on the City Plan at $1 per copy. The report contains 299 pages and 149 maps, charts, photographs and other illustrations. It includes an abstract of the testimony taken by the commission, the report of the committee of the whole of the Board of Estimate and Apportionment, a copy of the building zone resolution as adopted by the Board of Estimate and Apportionment and small scale maps of the districts established. The scope of the report and the great importance of this pioneer work are indicated in the following list of contents: Chapter I—Introduction; Chapter II—Necessity for Comprehensive Plan for City Building; Chapter III—Use Districts; Chapter IV—Appropriate Intensity of the Use of Land; Chapter V—Height Districts; Chapter VI—Area Districts; Chapter VII—Future Change and Development of Districting Plan. Appendices. I—Charter Provisions; II—Zoning Survey; III—Districting (Reprint from Heights of Building Report); IV—Record of Testimony and Statements in Relation to Necessity for Districting Plan; V—Some Results of Haphazard Development as Recorded by the Camera; VI—Report of the Committee or the Whole of the Board of Estimate and Apportionment July 18, 1916; VII—Building Zone Resolutions adopted by the Board of Estimate and Apportionment July 25, 1916 VIII—Map Designations and Map Designation Rules Accompanying Building Zone Resolution adopted July 25 1916; IX—Districting Resolution Annotations.

Race Segregation in Effect.

McAlester, Okla.—The race segregation ordinance recently passed by the city commission went into effect immediately upon its publication. Hereafter the negroes and whites are forbidden to move into neighborhoods where residents of the other color predominate. The ordinance says "It shall be unlawful for any white person to move into and reside in any colored block or for any colored person to move in and reside in a white block." The penalty provides for a fine of $25 to $100 for every offense, and each day or fraction thereof during which the offender continues to live in the forbidden territory is counted as a repetition of the act. "Colored blocks" and "white blocks" are defined as squares in which either race predominates at this time. The ordinance does not affect mixed neighborhoods as they stand now. Where negroes and whites live in the same district at present they may continue to do so. But if negroes attempt to move into a block where there are more whites than negroes the new ordinance will be invoked, and vice versa. Oklahoma City and Tulsa have passed such ordinances. This same kind of an ordinance is before the supreme court of the United States on a test case from Kentucky. The Louisville negro segregation ordinance was appealed to the supreme court from the court of appeals of Kentucky after all the courts in that state had declared it constitutional. The ordinance became effective May 11, 1914, and its purpose was to "prevent conflict and ill feeling between the white and colored races in the city of Louisville."

NEWS OF THE SOCIETIES

Calendar of Meetings.

July 30-Aug. 3.—SOUTHERN SOCIOLOGICAL CONGRESS. Annual meeting, Blue Ridge, N. C. Secretary, J. E. McCulloch, 508 McLachlen Bldg., Washington, D. C.

Aug. 1-3.—AMERICAN SOCIETY OF SANITARY ENGINEERING. Annual meeting, Grand Rapids, Mich. President, William C. Groeninger, Ohio State Board of Health, Columbus, O.

Aug. 6.—PACIFIC COAST ASSOCIATION OF FIRE CHIEFS. Twenty-fifth convention, Anaconda, Mont. Secretary, ex-Chief H. W. Bringhurst, Seattle, Wash.

Aug. 15-17.—LEAGUE OF WISCONSIN MUNICIPALITIES. Annual convention, Racine, Wis. Secretary, Ford H. MacGregor, Madison, Wis.

Aug. 21-23.—NEW YORK STATE FIREMEN'S CONVENTION, Flushing, N. Y. Secretary, Thos. Honohan, Frankfort, N. Y.

Aug. 22.—UNION OF NEW BRUNSWICK MUNICIPALITIES. Annual convention, St. John, N. B. Secretary, James King Kelley, St. John

Aug. 27-29.—UNION OF CANADIAN MUNICIPALITIES. Annual convention, London, Ont. Secretary, W. D. Lighthall, K.C., Westmount, Que.

Aug. 29-31.—UNION OF NOVA SCOTIA MUNICIPALITIES. Annual convention, Truro, N. S. Secretary, Arthur Roberts, Bridgewater, N. S.

Aug. 29-31.—ONTARIO MUNICIPAL ASSOCIATION. Annual convention, Toronto, Ont. Secretary, B. H. Spence, 705 Lumsden building, Toronto, Ont.

Sept. 5-8.—LEAGUE OF AMERICAN MUNICIPALITIES. Annual convention, Gary, Ind. Secretary, Robert E. Lee, City Hall, Baltimore, Md.

Sept. 10-15.—NATIONAL EXPOSITION OF SAFETY AND SANITATION. Annual conference, New York, N. Y. Secretary, W. C. Cameron, Continental and Commercial Bank building, Chicago, Ill.

Sept. 11-13.—AMERICAN ASSOCIATION OF PARK SUPERINTENDENTS. Annual convention, St. Louis, Mo. Secretary, Roland W. Cotterill, 533 City Hall, Seattle, Wash.

Sept. 11-14.—NEW ENGLAND WATERWORKS ASSOCIATION. Annual convention, Hartford, Conn. Secretary, Willard Kent, 715 Tremont Temple, Boston, Mass.

Sept. 18-20.—LEAGUE OF VIRGINIA MUNICIPALITIES. Annual convention, Lynchburg, Va. Secretary, L. C. Brinton, Portsmouth, Va.

Sept. 24-29.—LEAGUE OF CALIFORNIA MUNICIPALITIES. Annual convention, Santa Rosa, Cal. Secretary, Wm. J. Locke, Pacific Building, San Francisco, Cal.

Sept. 25-27.—SMOKE PREVENTION ASSOCIATION. Annual convention, Columbus, O. Secretary, Frank A. Chambers, City Hall, Chicago, Ill.

Sept. 27-29.—AMERICAN AND CANADIAN ENGINEERS AND ARCHITECTS OF NORWEGIAN BIRTH OR DESCENT. Informal congress and re-union, Chicago Norske Klub, Chicago, Ill. Chairman, Committee on Arrangements, Joakim G. Glaver, consulting engineer, Chicago, Ill.

Oct. 15-17.—NATIONAL HOUSING ASSOCIATION. Annual conference, Hotel La Salle, Chicago, Ill. Secretary, Lawrence Veiller, 105 East 22d St., New York City.

Oct. 17-18.—LEAGUE OF MINNESOTA MUNICIPALITIES. Fifth annual convention, St. Cloud, Minn. Secretary-treasurer, Richard R. Price, University of Minnesota, Minneapolis.

Oct. 22-24.—AMERICAN CIVIC ASSOCIATION. Annual meeting, St. Louis, Mo. Secretary, Richard B. Watrous, 914 Union Trust building, Washington, D. C.

Nov. 19-24.—CITY MANAGERS' ASSOCIATION. Annual meeting, Detroit, Mich. Secretary, W. L. Miller, City Manager, St. Augustine, Fla.

Nov. 20-23.—PLAYGROUND AND RECREATION ASSOCIATION OF AMERICA. Recreation Congress, Milwaukee, Wis. Secretary, H. S. Braucher, 1 Madison Ave., New York, N. Y.

Nov. 21-24.—NATIONAL MUNICIPAL LEAGUE. Twenty-third annual meeting, Hotel Statler, Detroit, Mich. Secretary, Clinton Rogers Woodruff, 703 North American Bldg., Philadelphia, Pa.

League of Wisconsin Municipalities.

The nineteenth annual convention of the League of Wisconsin Municipalities will be held in Racine Aug. 15-17. Forty cities have joined the league since the meeting held in Oshkosh last year, and now all cities in the state with a population of 5,000 are members, according to the secretary.

More than 225 delegates, including 50 mayors, were present at the Oshkosh meeting last year, and this year between 300 and 400 are expected, as all but 15 of the 128 cities of the state will send representatives.

A large number of new problems which the war has brought before cities will be emphasized at this convention along with the usual subjects. Questions of registration for the army and the draft will be considered. Municipal employment bureaus to aid the state and county councils of defense, and city markets will be discussed.

Mayor C. B. Clarke, Neenah, is president of the league; Mayor H. W. Adams, Beloit, is vice-president; and Prof. Ford H. McGregor, head of the municipal reference bureau of the University of Wisconsin Extension division, is secretary-treasurer.

The board of trustees consists of Mayors Daniel Hoan, Milwaukee; John Mulva, Oshkosh; I. W. Thiessen, Racine; C. B. Clark, Neenah, and H. W. Adams, Beloit.

The district vice-presidents are: Mayors H. A. Runkel, Burlington; John Kaiser, Port Washington; George C. Sayle, Madison; Hans A. Koenig, Wauwatosa; A. A. Bently, La Crosse; H. E. Marquardt, Wausau; Elmer Hall, Green Bay; G. E. Dee, Chippewa Falls; Joe Konkel, Superior; Alderman Henry Smith, Milwaukee, and ex-Mayor Frank J. Wolff, Fond du Lac.

Utah Better Roads Association.

The Utah Better Roads Association was organized July 21 at Salt Lake City by delegates from the counties throughout the state.

The convention was opened at 10 o'clock by Herbert S. Auerbach, who was temporary chairman of the convention. He introduced Lester D. Freed, who told of the needs of the state in regard to highways, and said that with good roads throughout the state that the state would grow much quicker than waiting for railroads to be built. He asserted that the counties of the state should get together in the movement for good roads and that what was of benefit to one county would be of benefit to all. He was followed by Secretary of State Harden Bennion, who told the convention of the laws which were passed by the last legislature for the benefit of the roads, and who spoke briefly of the work which is being done by the state highway commission in securing good roads.

W. W. Armstrong was then selected as chairman of the convention, and in a short address pointed out the needs of the state. Mr. Armstrong, who was sponsor for the $2,000,000 bond issue for roads in the legislature, declared that with good roads all parts of the state would be placed in touch with the best markets. He urged the delegates to the convention to keep up the work for good roads the year around. R. T. Thurber and Charles Tyng were selected as the temporary secretaries of the organization to take care of the business of the convention.

A number of road machinery houses had exhibits at the convention and motion pictures of the making of good roads in the south and the Pike's Peak road were shown. C. A. Adams, president of the Pike's Peak Ocean-to-Ocean highway, was present at the convention.

The committees appointed to handle the affairs of the convention were as follows:

Organization—W. H. Wattis of Ogden, chairman; Le Roy Dixon of Provo, John Barnes of Kaysville, F. C. Scramm of Salt Lake, John P. Johnson of Spring City, M. T. Dobson of Kanab, J. W. Hendricks of Richmond, George A. Fisher of Heber, Earl Thompson of Vernal, E. H. Snow of St. George and Herbert S. Auerbach of Salt Lake.

Resolutions—Ralph Bristol of Ogden, chairman; Henry Welsh of Park City, Harold Allahman of Springville, T. W. Naylor of Salt Lake and R. M. Pope of Duchesne.

PERSONALS

Cobb, Lamar, has resigned as state engineer of Arizona. He will be succeeded by Thomas Maddock.

Cottrell, C. C., formerly connected with the California highway commission, is now assistant highway engineer of Nevada.

Ellis, W. H., has been appointed to succeed Edward G. Kane as commissioner of public works of Butte, Mont. Mr. Ellis was formerly assistant city engineer of Anaconda, Mont.

Guise, Philip, has been appointed county engineer of Sussex county and town engineer for Newton, N. J.

Henderson, C. E., has resigned his position as city engineer of St. Augustine, Fla., to assume that of county engineer of St. John's County. He will continue his location at St. Augustine, which is the county seat.

Hooker, Paul, has resigned his position of first assistant engineer on waterworks and sewage in the Pennsylvania state department of health.

(Continued on page 122)

NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

TRUCK WINCHES.

Mead-Morrison Equipment for a Variety of Purposes.

The Mead-Morrison line of truck winches are designed not only to make it possible to put a truck on which they are installed to many new uses, but also to materially lower the cost of work performed by the truck. Use of the winches enables the truck operator to use the truck during the usually idle periods of loading and unloading, thus cutting down the time and number of men necessary. The line includes three types of winches—the vertical capstan, the friction drum and the underslung double winch—each of which may be used for a number of purposes.

The vertical capstan winch is of such all-around use that it would prove a very valuable equipment for any truck with a platform body. It should find a particularly popular service on such work as loading and hoisting for contractors, electric light and power and water utilities, street and public works departments, park departments, etc. It can not only haul heavy machinery up to the truck body, but also haul the truck itself out of mud-holes and ditches. It is powerful and occupies a minimum of loading space. It is fitted with an automatic brake, which is designed so as to positively prevent backward turning of the winch head should the driving chain break. This is a particularly good feature in handling valuable machinery. The worm gearing runs in oil. The winch head is bronze bushed. The rope pull, single line, is 3,500 pounds; the rope speed, single line, is 60 feet per minute; the space required is 22 inches square; the weight is 350 pounds, complete; and the winch head is 8 inches in diameter by 11 inches long.

The friction drum, which is specially designed for automobile truck use, for work on which it is customary to use wire rope instead of the manilla or hemp rope used on capstans and winch heads. This type may be used to advantage in pulling light and power and other electric wires through conduits. It may also be used for public utility poles in which type of work it has been found particularly successful because of the latched foot lever operating the brake, since by its hold the load can safely be held suspended at any point. This friction drum winch can also be used, with excellent results, for such other purposes as pulling scraper buckets for back-filling trenches, hauling wire reels and machinery on the truck body and for pulling trailers, etc., to the truck. The worm gearing runs in oil and the friction surface is asbestos lined. The drum is independent of winch heads. The drum is bronze bushed and fitted with asbestos lined brake, operated by latched foot lever. The drum shaft bearings are so arranged that wearing of chassis when going over rough ground will not break the side frames or drum. The rope pull, single line, is 4,000 pounds and the rope speed, single line, is 60 feet per minute. The drum diameter is 10 inches and the winch head diameter, 6. The space required (front to back) is 27 inches and the outfit weighs 1,425 pounds complete.

The horizontal underslung double winch has in the past been used chiefly on army trucks, but is now receiving favor in commercial service. The underslung is designed to give a greater rope pull than the vertical capstan. It has the further advantage that all the loading space is left clear, as the winch is below the body. It may be used for hauling other trucks out of holes and ditches and for pulling heavy machinery and materials on to the truck body. Contractors have found it of great use in changing the position of hoisting engines and concrete mixers and for hauling loaded trailers from excavated ground on the truck itself. The winch is well adapted for installation on dump body trucks and on "road making trucks." It is also equipped with the valuable automatic brake feature. The rope pull, single line, is 6,000 pounds and the rope speed is 120 feet per minute. The winch heads are 8 inches in diameter and the weight, complete, is 1,000 pounds.

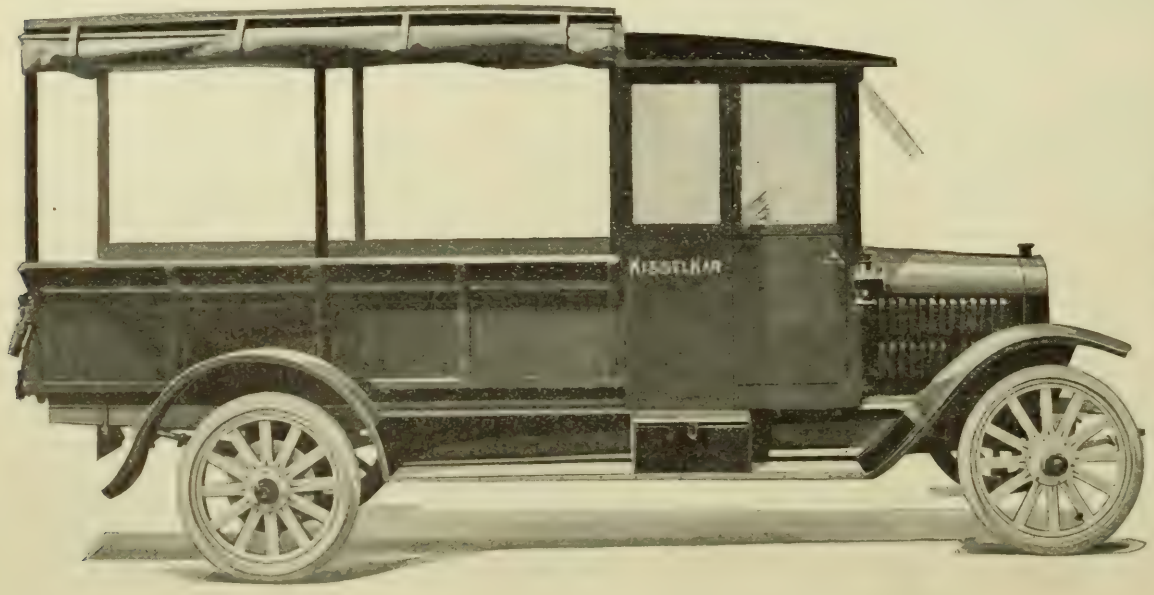
Cuts on pages 119, 120 and 121 show the different types of winches and the equipment in action. The winches are made by the Mead-Morrison Mfg. Co., East Boston, Mass.

ALL-YEAR CAB.

New Feature for Kissel Trucks.

An innovation which promises to have a marked effect on the efficiency and comfort of motor truck drivers and one that will give increased results to truck owners is that of the All Year Cab, originated, designed and built by the Kissel Motor Car Company, Hartford, Wis. It is a new adaptation of Kissel's original convertible idea, giving to truck drivers a closed, warm cab in winter, and which can be easily and quickly changed into the Kissel standard open cab in summer.

Standing a little over five feet from chassis frame to roof, the cab frame is of extra hard wood, bolted and locked. All sides and doors are covered with specially treated sheet metal enabling



KISSEL TRUCK WITH ALL-YEAR CAB—WINTER POSITION.

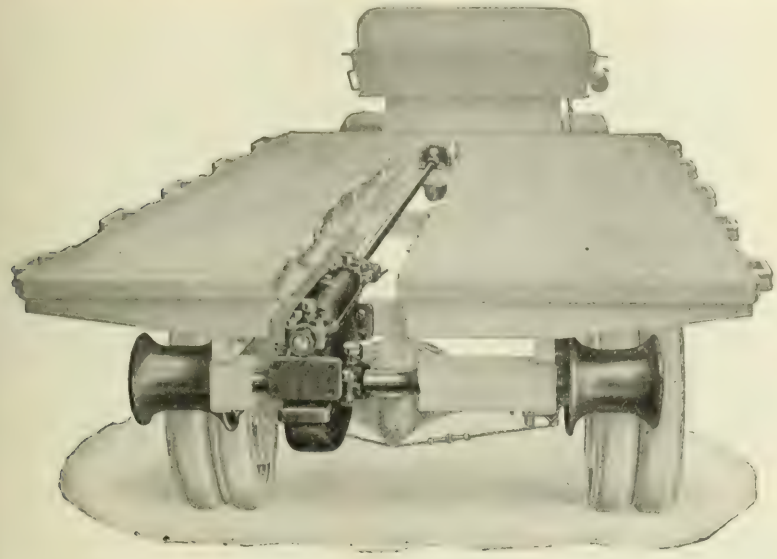
the cab to withstand the twists of the frame when negotiating rough roads. Instead of the common wooden dash that loosens quickly, the All Year cab dash is of heavy plated metal giving unusual substantiality.

The seating capacity is for three men, with plenty of leg room. Tank and tool compartments are under the seat. Doors on each side measure 25 inches wide—an unusual width for truck cabs. Metal pockets are furnished on both sides of cab for time, tire, gasoline and other mileage record cards and books. Another feature is that of the instrument board set at right angles, with plenty of space for all necessary electrical instruments, speedometer, gauges, etc. Special Pittsburg glass is furnished for the doors, sides and rear window, which has a heavy wire protection screen. A rain-vision windshield is also included with the winter equipment.

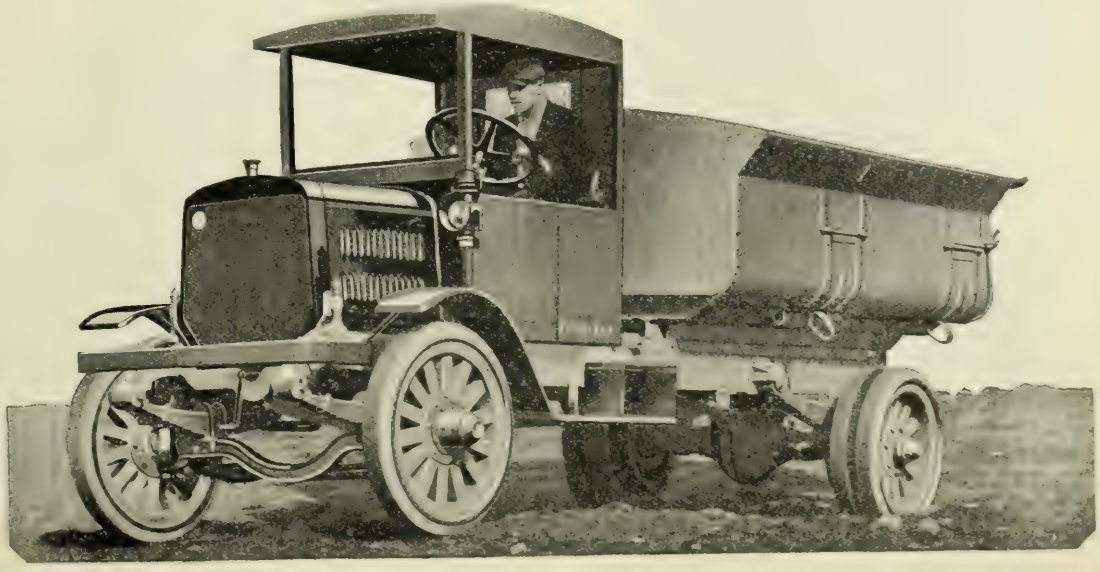
The All Year cab is built to be windproof, rain-proof, cold-proof—in fact, all-weather proof, not only giving the driver in winter a warm, dry, comfortable housing under all climatic conditions, but a cab that is solid and substantial, roomy, sightly and attractive. To change the All Year cab into the Kissel standard open summer cab, the winter inclosures, consisting of windshield, side, door and rear windows, are easily and quickly removed.

The All Year cab, which the Kissel Motor Car Company has been experimenting with all winter, covers other original and exclusive features designed to insure all parts fitting closely, securely and permanently in the most severe weather.

With this truck drivers and helpers will not have to work unprotected in winter weather nor truck owners jeopardize their property in the hands of frozen drivers. The All Year cab, which is exclusive with the new Kissel trucks, is in its open form, without the winter inclosures, standard equipment on all the new Kissel truck models excepting "The Flyer" light delivery car. The cab, summer and winter form, is shown in the accompanying illustrations.



MEAD-MORRISON HORIZONTAL DOUBLE UNDERSLUNG WINCH—SHOWING POWER TRANSMISSION.



KISSEL TRUCK WITH ALL-YEAR CAB—SUMMER POSITION.

COMBINATION ROAD MACHINE.

Spaulding Excavator, Self-Loading and Self-Dumping Wagon.

The Spaulding road machine is designed to give a variety of services in contractors' work of many types. It may be used for road making, excavating, leveling, filling, shallow drainage ditching, straightened water courses, irrigation ditching and many other kinds of work.

The loading device on this self-loading machine is a part of the body, being attached to the front end of the body, and the body being pivoted on the rear axle a little back of its center. The cutter or blade is attached to the main frame of the body, is convexed and polished like a plow shear and extends back to the steel guard, which extends a little over the lower front end of the endless elevator apron, which elevates the dirt into the front end of the body. In the bottom of the body is the main endless apron, which carries the material to the rear as fast as the front end is filled. This end of the body, to which the blade is attached, is raised and lowered by a worm gear, which is under the control of the operator, and can be held to any depth desired. Both the elevator apron and the main apron are under the operator's control, and either may be run independent of the other.

In order to load the machine, it is simply necessary to throw the elevator in gear and lower the front of the body until the cutting edge is at the desired depth. As the front end of the body is filled the main apron is thrown into gear as desired, until the load is completed. The front is then raised and the load is ready to be delivered. The load may be dumped in one place by a foot lever, or spread while the machine is advancing 45 feet, by throwing the main apron into gear. The machine need not be stopped for any operation excepting when dumping in one place by means of the foot lever.

The machine is easily handled by four good horses or a light twelve

horse-power tractor. Roller bearings and hard oilers throughout make the equipment light running. One man, it is claimed, can easily handle the team and control the machine without any assistance. The machine will work on sod or hard road without the need of plowing. It is built to load 1½ to 2 cubic yards of dirt in 20 seconds and to unload it in an equal time, either scattering it evenly over forty feet of roadway or dumping it in one pile in a low spot or hole. In building grades the road is kept smooth and free from dumped dirt. It has been timed to load 15 loads while nine men with shovels loaded one. In excavation work records indicate that work can be done at about one-fourth the cost of doing it with teams.

The illustration on page 122 shows the outfit, drawn by a tractor, at work. It is made by the Spaulding Manufacturing Co., Grinnell, Ia.

TRACTOR-TRAILER DUMP TRUCK.

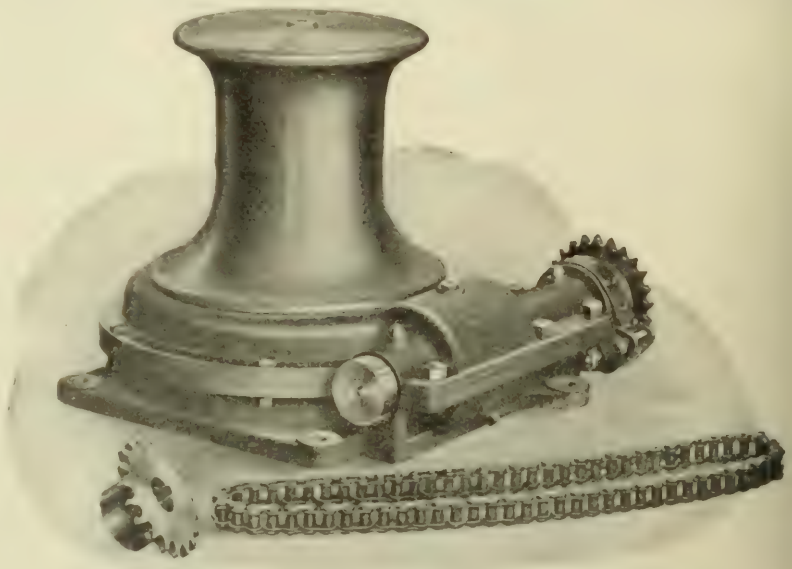
Harvey Machine With Hydraulic Hoist.

The handling and hauling of materials even with the economy and efficiency of motor equipment still presents a number of problems which, if they could be properly solved, would still further reduce costs and conserve time. The burden of idle time while loading at team tracks can be cut down by the use of trailers. This improvement was for a time at a disadvantage, however, when it came to dumping.

This latter important difficulty is now claimed to have been overcome in the design of the Harvey tractor-trailer dump truck. A six-ton outfit, for instance, recently sold to the Standard Material Company, one of the largest construction material firms in Chicago, consists of a tractor and two trailers, each trailer having a capacity of six tons. Each of the trailers has a hydraulic hoist, the pump and oil tank being mounted on the tractor, and connection being made to the hoist on the trailer by means of a flexible hose with a quick attachment, so that little time is lost in changing from one trailer to another. Each trailer has two heavy duty jacks, which quickly raise the trailer from the fifth wheel attachment on the tractor and supports it while being loaded.

The fifth wheel construction on the tractor, together with the short wheel base on the tractor, gives the outfit a very short turning radius, making it valuable for use at team tracks and in other places where loading or unloading could be practically impossible with the average truck.

The Standard Company's outfit, which is shown in one of the illustrations on page 121, has been severely tested by gruelling service, and the economy of the outfit, it is reported, has been already strikingly indicated. The other illustration shows the hydraulic hoist arrangement and connections for operating the dump mechanism. The equipment described is made by the Harvey Motor Truck Works, Harvey, Ill.



MEAD-MORRISON CAPSTAN WINCH.

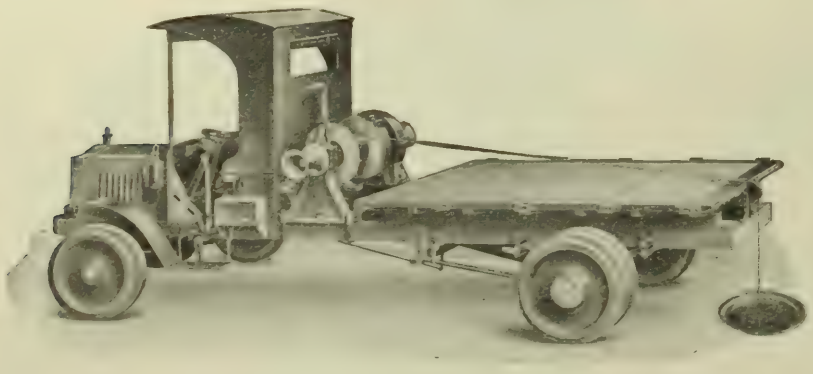
INDUSTRIAL NEWS

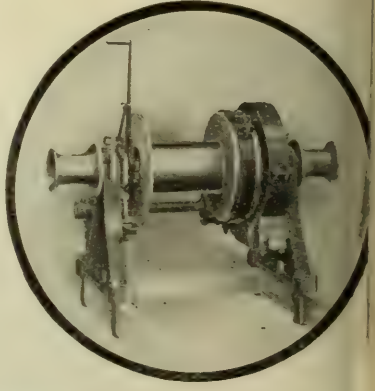
Cast Iron Pipe.—Prices continue at the record high levels of the last few weeks. While private buying continues to some extent, municipal business is far below actual needs. Quotations: Chicago—4-inch, class B and heavier, $68.50; 6-inch, $65.50. New York—4-inch, class B and heavier, $68.50; 6-inch, $65.50. Birmingham—4-inch, class B and heavier, $63; 6-inch, $60; class A, $1 extra.

The Odorless Sewer Basin Company Youngstown, O., announces the appointment of Frank H. Dimon, Milan O., formerly state fire marshal, as special representative to call on city engineers and officials on behalf of the company's odorless cast iron sanitary sewer basin.

Bulk Cement.

The Portland Cement Association 111 West Washington street, Chicago Ill., has issued a pamphlet on the "common sense and economy" of using bulk cement. The main reasons given for handling cement in this way are the savings due to the following: No sack loss. Less labor from car to mixer. No labor to count, bundle and return cloth sacks. No bookkeeping on sacks. No valuable storage space used for them and no fire insurance to pay for them. No hauling charges or freight to pay on sacks returned and no interest to pay on money tied up in sacks. The classes of work in which bulk handling is held to be particu-

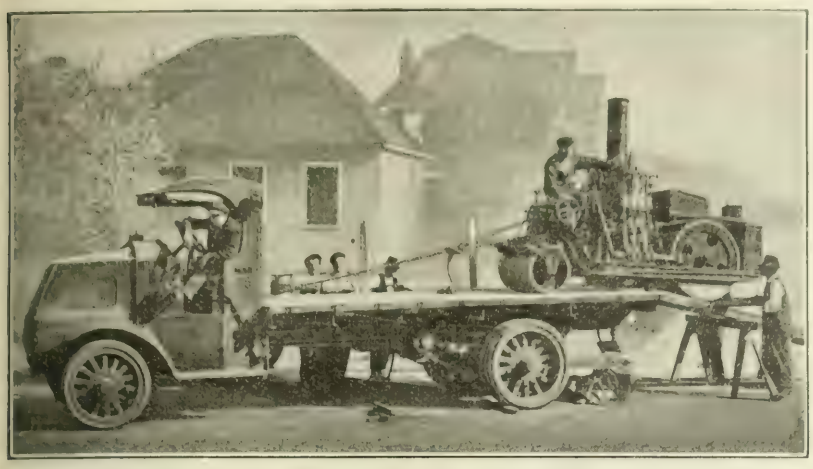




MEAD-MORRISON FRICTION DRUM WINCH AT WORK.

arly advantageous and the methods mployed are explained with practical nd helpful detail. Unloading, han- ling and measuring are described. A artial list of bulk cement users is iven.

The booklet says: "As a container or portland cement the wooden bar- el is almost a thing of the past. The loth sack and paper bag are similarly ut of place on many construction jobs



MEAD-MORRISON CAPSTAN WINCH HAULING UP ROLLER.

d in plants where concrete products e manufactured. The shipment of ment in bulk is neither new nor revo- tionary. It is the simplest and least pensive method of getting cement m the manufacturer's bin to the job. ulk cement was first used about thirty ars ago, but shipment in this form as not extensive until 1912. Then sev- al contractors saw the possibilities of aking a saving by handling their ce- ent in the same manner as sand, bbles and crushed stone. Their suc- ss has led to a marked increase in e shipment of cement in bulk. There every probability that in the near ture the use of cement in sacks on ge construction jobs, in cement prod- ucts plants and even on many small pieces of concrete work, will be excep- tional."

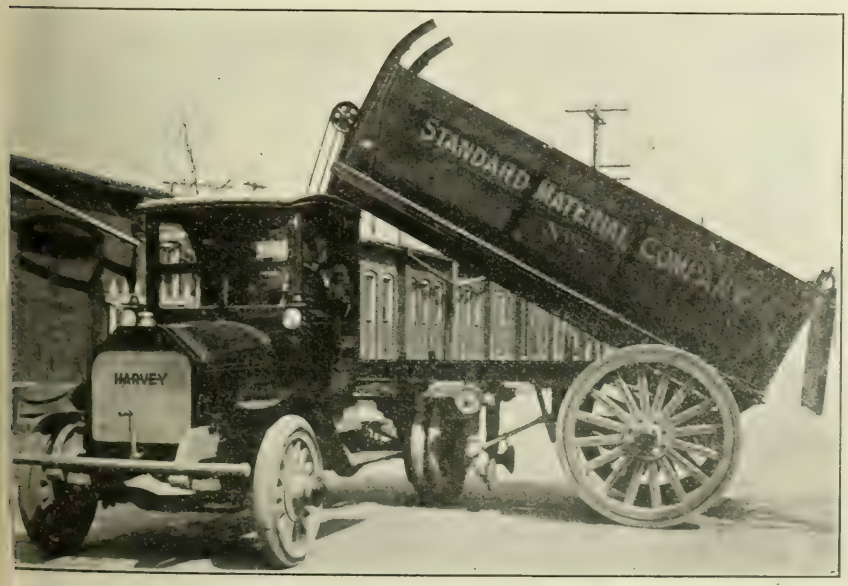
Truck Bodies for Army Service.—Contracts for 24,050 motor truck bodies have been let by the War Department. The International Harvester Co. of Chicago will build more than one-third, its contract being for 10,000. The next largest contract is with the Grand Rapids School Equipment Co. of Michigan for 6,400. The other awards follow: London Auto Supply Co. of Chicago, 1,900; Mulholland & Co., Dunkirk, N. Y., 500; Hercules Buggy Co., Evansville, Ind., 400; Theodor Kundtz Co., Cleveland, 550; G. W. Stratton Co., Defiance, Ohio, 1,000; Eagle Wagon Works, Albany, N. Y., 1,200, and Continental Car Co., Louisville, Ky., 2,000.

The George Cutter Company, South Bend, Ind., announces the addition to its sales organization of J. H. Lynch, who will operate from the compay's branch office in New York City. For fifteen years Mr. Lynch has been associated with the electrical industry as a central station man, contractor and salesman. During the last five years he has been connected with the Buffalo office of the Westinghouse Electric & Manufacturing Company and has made many friends in the electrical trade in the eastern territory.

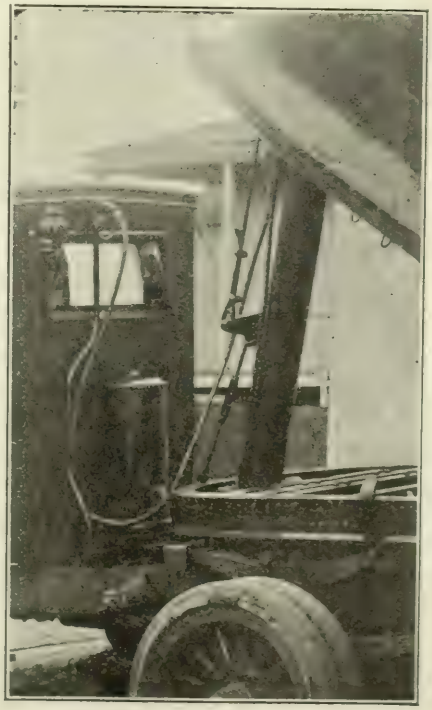
Thomas T. Fauntleroy has been appointed receiver by the circuit court for the **Sanitary Street Flushing Machine Company,** and was instructed to file suit against the Studebaker Corporation of Detroit to recover the assets of the company. These assets, which include patents, are estimated to be worth $500,000. The assets were sold about a year ago under a mortgage held by M. J. Hurley, of the Efficiency Contracting Company, which was organized by Hurley and later, it was alleged, sold to the Studebaker Corporation in a deal promoted by Hurley and Charles Sutter, president of the Sanitary company.

The Asbestos Protected Metal Company, Pittsburgh, Pa., announces the temporary closing of its Cincinnati office on August 1, 1917, due to the fact that Mr. E. G. Irwin, Cincinnati manager, has entered the Ohio National Guard. Communications addressed to the home office, First National Bank building, Pittsburgh, will receive immediate attention.

The Goodyear Tire & Rubber Co., Akron, Ohio, is announcing the following changes in branch managers: B. S. Waterman, formerly branch manager at Boston, Mass., has been placed in charge of the solicitation of manufacturers' business in all departments, for the New England district. C. B. Peschmann, who has been in charge of



HARVEY TRACTOR-TRAILER DUMPING.



HARVEY HYDRAULIC HOIST.

the Goodyear sales school at Akron, becomes manager of the Boston branch. K. H. Dresser, formerly manager of the Springfield, Mass., branch, has been transferred to Akron, and succeeded by R. E. Lane. Edward Lingenfelder, for a number of years manager of the Los Angeles branch, and one of the most widely known tire men on the Pacific coast, has resigned to go into business for himself as a tire dealer. George Bellis has advanced from the position of manager at Sacramento, to manage at Los Angeles, succeeding Lingenfelder. C. B. Reynolds, formerly manager, Tacoma, Wash., is now manager at Sacramento. A. E. Patterson, former salesman in the Portland, Oregon, branch, is now manager at Tacoma, Wash.

PERSONALS

(Continued from page 117.)

Jewell, Albert H., is now sanitary inspector on the Michigan state board of health. He has been assistant engineer in the state board of health of Kansas.

Jones, A. W., formerly assistant director of the Portland, Ore., public employment bureau, becomes head of that bureau, succeeding N. F. Johnson, who becomes chief of police.

Kenan, R. L., formerly county engineer of Chilton Co., Ala., has formed a partnership with Fulton Pace, to be called Kenan & Pace, consulting and highway engineers.

Krug, Frank S., has been appointed chief engineer of the Cincinnati Rapid Transit Commission. He will continue in his duties as city engineer.

McNally, Edward, has been appointed chief of the Richmond, Ind., police department.

Mayor Puchta of Cincinnati has appointed the following as members of the City Flood Prevention Commission: Albert Bettinger, chairman; Gabe Weil, E. C. Gibbs, A. J. Conroy and city engineer Krug.

Montgomery, Julian, has been appointed chief office engineer of the state highway department. He was previously city sanitary engineer of Austin, Tex.

Poole, Cecil, consulting engineer, Atlanta, Ga., and mechanical engineer for the city, has been appointed a member and the secretary of the Board of Consulting Engineers of Atlanta, which was recently created. Mr. Poole has been editor of technical magazines. For a number of years before going to Atlanta, Mr. Poole had made a special study of electrical machine design and construction and of gas power engineering. He is widely known as a writer on technical subjects and is a fellow of the American Institute of Electrical Engineers and a member of the American Society of Mechanical Engineers.

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

The WATERWORKS of Jasper, Minn., will be improved according to plans and specifications prepared by J. A. Rowatt, Willnar, Minn.

Extensions to its SEWAGE DISPOSAL PLANT are contemplated by Haddonfield, N. J. The engineers for the improvement are Remington & Vosbury, 6th and Market streets, Camden, N. J.

STREET IMPROVEMENTS are to be made by Georgetown, Ont. The consulting engineer for the work is Herbert Johnston, 130 Lancaster street, E., Kitchener, Ont.

Montgomery County, Norristown, Pa., is to reconstruct a ROAD at a cost of $100,000. The engineer for the improvement is Chas. Mebus, 110 South Broad street, Philadelphia, Pa.

A large concrete RESERVOIR is to be constructed by Cumberland, Md. The consulting engineer for the proposed improvement is James H. Fuertes, 140 Nassau street, New York, N. Y.

Utiea, N. Y., is considering the purchase of the WATER WORKS of the Consolidated Water Co. of the city. The city has retained to investigate and APPRAISE the property, Hill & Ferguson, engineers, 100 William street, New York, N. Y., and Charles H. Poole, expert appraiser, Utica, N. Y.

The New Jersey Bridge and Tunnel Commission is progressing in its proposal to construct an $8,000,000 suspension BRIDGE between Camden and Philadelphia. The consulting engineers to prepare plans and specifications for this important project are Waddell & Co., 165 Broadway, New York, N. Y., and 800 Graphic Arts building, Kansas City, Mo.

Palo, Kans., is to construct an ELECTRIC LIGHT PLANT and WATERWORKS. The engineer is G. P. Taylor, Stockton, Kans.

SEWERS and PAVEMENTS are improvements proposed for Torranceton, Pa. The engineers to prepare plans and specifications are Paxson & Morgan, Second National Bank building, Wilkes-Barre, Pa.

SEWERS are to be constructed by Dardanelle, Ark. The district commissioners have the engineering services of Ford & MacCrea, 325 Gazette building, Little Rock, Ark.

Red Fork, Okla., is to improve its WATERWORKS. Plans for the work are in preparation by the engineer, W. E. Davis, 344 Bank of Commerce building, Tulsa, Okla.

WATERWORKS extensions to cost $125,000 are proposed by Poteau, Okla. The city has the expert services of the Benham Engineering Co., 1300 Colcord building, Oklahoma City, Okla.

Duval County, Jacksonville, Fla., is to build a BRIDGE to cost $1,000,000, bonds for which have been voted. Harrington, Howard & Ash., Orear-Leslie building, Kansas City, Mo., are to prepare plans and specifications.

To avoid GRADE CROSSINGS the Allentown, Pa., city planning commission has retained Frank Koester, consulting engineer and city planning expert, Hudson Terminal building, New York, N. Y., to prepare street plans for the site of an eight mile railroad to be built by the Lehigh and New England Railroad Co. of Bethlehem and to be used exclusively for industrial developments. Mr. Koester prepared a comprehensive city planning report for the city a year ago.

SPAULDING EXCAVATOR, SELF-LOADING AND SELF-DUMPING WAGON.

Municipal Journal

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SEWER WORK IN ROCK AND QUICKSAND

Comparative Bids on Brick and Segment Block Sewer—Excavating by Clam-Shell and Trench Machine—Horizontal and Vertical Sheathing—Handling Trench in Quicksand.

BY W. E. HARDENBURG.

Following the introduction of the tile sewer in St. Louis something more than a year ago, the use of this type of conduit is increasing rapidly in the Missouri metropolis. In some work recently completed in Baden, a section in the northern extremity of St. Louis, several interesting processes were evolved in coping with the conditions encountered during the construction.

In the first job, in Baden Sewer District No. 2, bids were asked for 9,500 feet of vitrified clay pipe sewers, 12 to 33 inches in diameter, and for 2,800 feet of sewer from 39 to 57 inches in diameter. The advertisement for tenders provided that the bids might be made for sewers to be constructed either of brick laid in Portland cement or of two-ring segment block made of vitrified tile.

The 357 feet of 57-inch sewer was to be 13 inches thick, if of brick, while the other sizes—39 to 54 inches—were to be 9 inches thick. In case the bid was to be for tile sewers, it was specified that the thickness of the sewer was to vary from 7¼ inches for the 57-inch pipe to 5½ inches for the 39-inch.

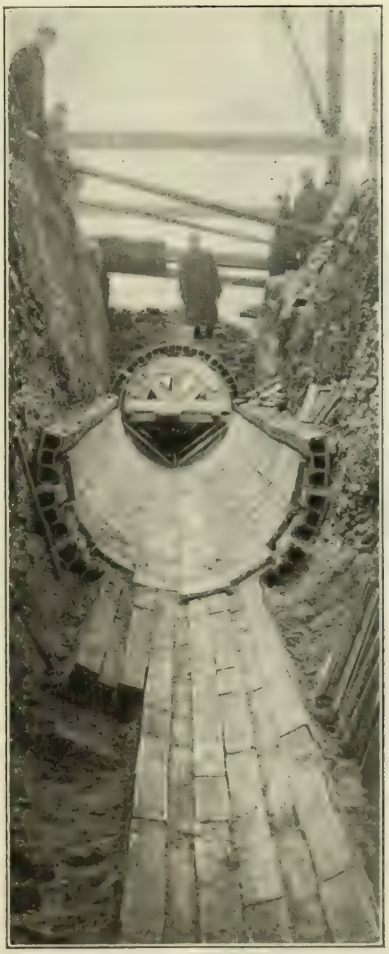
Bids on the tile sewer were to be per lineal foot, but the bids based on the brick type were to be per cubic foot of brick masonry, the quantities being estimated. The cost of excavation was to be calculated distinct from the cost of the material itself, as, owing to the comparative thinness of the tile, less excavation would be required if tile were to be used.

Another clause provided that, if the tile were to be used, the sewer was to be supported by haunches of concrete of a mixture of 1:3:6, the contractor to figure costs for this on estimated quantities to be provided by city engineers.

The following shows the lowest bids per lineal foot for brick and tile, respectively:

Size	Brick	Tile
39-inch	$3.11	$2.31
45-inch	3.50	2.64
48-inch	3.69	2.97
54-inch	4.08	3.30
57-inch	6.56	4.27

The contract was awarded to the J. B. Prendergast Construction Co. for the construction.



PROGRESSIVE STEPS IN LAYING A 54-INCH SEWER.

On this job all the excavation work was done by a clam-shell bucket, hung from the end of a 45-foot boom, mounted on a bull-wheel derrick. The soils met with varied from slack clay to quicksand, and some difficulty was experienced at first in the latter.

In the clay sections of the line, the trench ordinarily was braced with 3-inch horizontal sheeting, inserted in 20-foot lengths, the cross-braces being 6 by 6, spaced 10 feet center to center.

In the quicksand section, the top clay was sustained as mentioned above and, in addition, 3-inch tongue and groove sheet-piling was driven to 3 feet below the flow line of the sewer. The piling, which consisted of 3 by 10-inch pine boards with ¾-inch tongue and groove, was driven down with a 33,000-pound Arnott steam hammer in double leads that moved on rollers on both sides of the ditch. As a rule, all this sheeting and piling was left in.

The bottom excavation was all done in 20-foot sections, bulkheads being erected at the end of each section. When the desired depth was reached, 1 by 12-inch transversals were nailed to 2 by 4-inch sills and a layer of concrete in burlap sacks placed on the flooring as the permanent foundation.

The invert also was laid in 20-foot sections as a rule, though in especially bad places the sections were only 10 feet long. In constructing the arch, an 8-foot wooden center with loose lagging for the middle 18 inches was employed, thus permitting the worker to stand in the center and lay the tile on both sides.

Throughout the work, gravel was used to provide a solid bearing for the outside blocks. In most cases the inner blocks were cut to fit around all junctions. Pipe-line connections were made by means of 45 degree slants, and the spaces between the pipes and blocks were filled with brickwork. The manholes were constructed of brick from the spring to the surface, while reducers, 10 feet in length, were constructed of rings of brick.

Curves in the invert were formed by means of a wooden templet, cut to the required radius. The arch was laid with a 5-foot center, built to the curve.

In some places on curves a certain amount of difficulty was experienced in connection with joining the inner and outer blocks in such a way as to prevent leakage. It was found that great care was necessary in making the joints.

In the second job, which was in Baden Sewer District No. 3, just north of the work described above, the principal sizes of tile sewers laid were 39-inch and 51-inch. Here a large stretch of the soil encountered was rock, and hence the prices, specifications and methods of procedure in general were somewhat different than in the work so far described.

The contract provided that in places where the excavation was solid rock, only the liner block of the invert need be laid, a bed of concrete on the rock bottom taking the place of the outer block.

On this basis, the prices per lineal foot were:

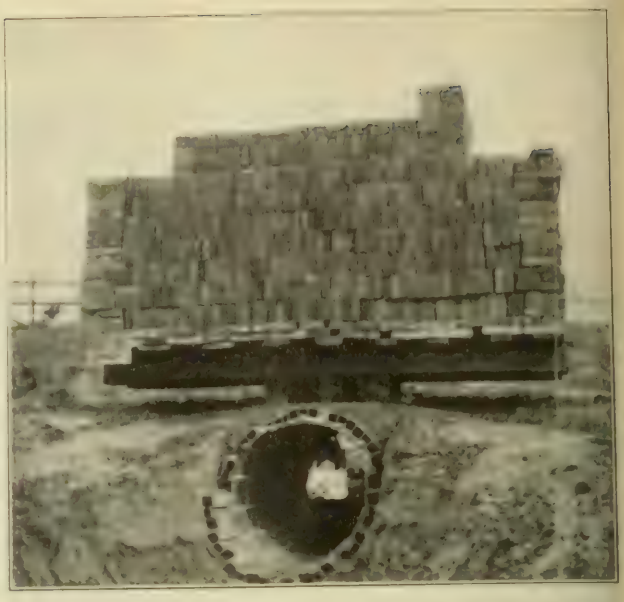
Size	Double Block	Inner Block Only
39-inch	$3.00	$2.50
51-inch	4.00	3.50

The saving in rock excavation effected by omitting the outer block was estimated, where the 51-inch sewer was laid, at approximately 2 cubic feet per lineal foot of trench. For the 39-inch sewer, the saving was somewhat less.

Where the liner block only was used, the rock was excavated to the required depth and a foundation of 1:3:6 concrete was laid on top of the rock. Generally, a somewhat dry mix was employed. The concrete filled the holes caused by the blasting and formed a bed upon which the liner blocks were laid. As soon as this was done, the concrete was left to set. The rest of the work was done as in ordinary cases.

Apart from the rock, sand constituted the principal soil met with in this job. No quicksand was encountered. In addition to the clamshell, a Potter sewer trench machine was employed.

FIFTY-ONE-INCH SEWER ON 25-FOOT RADIUS.



TESTING 18-INCH SEGMENT BLOCK SEWER.

The tile used in both of the jobs described was what is known as the Ferguson block. It is made in St. Louis by the Evens and Howard Fire Brick Company.

Some interesting tests were carried out with this block by the St. Louis engineering authorities. Two sections of 60-inch sewer, each 7½ feet long, one of tile, 7¼ inches thick, and one of two-ring brick, 9 inches thick, were buried, the haunches being thoroughly rammed to insure a firm bearing. Through sand cushions, a load was applied to an area of 4 feet along the axis of the sewer by 3½ feet wide. Both types of sewer showed a crack at a pressure of 57,000 pounds. At a pressure of 116,000 pounds, the tile collapsed and the brick also virtually succumbed. In another test the tile withstood a pressure

Both of these jobs, and the test as well, were carried on under the supervision of Benjamin Moreel, assistant engineer of the Board of Public Service of the City of St. Louis.

OILING ROADS IN IOWA.

A greater amount of earth road oiling was carried on in Iowa in 1916 than in any previous year. Very satisfactory results were obtained, a better quality of oil being used and more care taken in the preliminary preparation of the road for the treatment. Oils vary greatly and it is essential that a suitable one be used. The Iowa Highway Commission tests oils and advises road authorities as to the quality.

The following is the anlysis of an oil which has been used with success:

Specific viscosity, 100 c. c. 50° C. (Engler)	30.1
specific viscosity, 100 c. c. 50° C. (Engler)	30.1
Loss on heating 163° C.-5 hrs	2.14
Character of residue	Sticky
Total bitumen	99.93
Bitumen insoluble in 86° Be. naphtha	8.46
Fixed carbon	7.13
Ash	Nil.
Flash point (open cup)	396°
Burning point (open cup)	460°

The Engineering Experiment Station secured the use of a pressure distributor with a heater attachment for several of the counties and furnished an engineer to advise regarding the application of the oil. The conclusion of the Highway Commission regarding oiled roads are:

The treatment can be considered only as an efficient method of maintenance and must be repeated annually.

The preparation of the road surface preliminary to oiling is of great importance.

It is advisable to use a good quality of oil, even at an increased cost.

Better results are obtained by heating the oil.

PARKING IN CITIES.

The Express-Advertiser of Portland, Me., has obtained information from the city clerks of several cities of between 50,000 and 100,000 population concerning the methods which they employ in providing parking spaces for automobiles. Four of the cities have given information as follows:

Manchester, N. H., is considering the advisability of allowing the use of a park or common in the heart of the city just off the main street as a parking place for automobiles.

New Bedford, Mass., last year assigned as a parking place a vacant lot which is styled the "municipal lot," which is located in the business center of the city and is about 191x142 feet in size. No charge is made for the use of this.

Peoria, Ill., has selected two of its extra wide streets and marked off the center of the same so that cars can be parked therein. About 50 automobiles can be accommodated in each block. On other streets, cars can stand for one hour at a time, except on Sundays and holidays. There are also some one-way streets on which cars are parked.

In Springfield, Mass., automobiles are allowed to park in the main street for 10 minutes only and on certain streets they are not allowed to park within 100 feet of the main street, although on most streets this distance is only 50 feet. On all except the main street, vehicles stand all day and all night without any prohibition, which is the cause of much complaint on the part of merchants whose patrons are thus prevented from alighting at their doors, but the police are powerless to prevent it. A committee of the city government is now amending the rules of the road and proposes to limit automobiles and other vehicles to 20 minutes on the side streets.

HAULAGE METHODS AND COSTS ON OHIO ROAD WORK.

In the construction, during the past two or three years, of the National Road through Ohio, the haulage of materials has been a difficult problem for the contractor. R. N. Waid, Division Engineer of the State Highway Department, in a recent paper before the Ohio Engineering Society, described the various methods of transportation employed by the contractors.

As the contracts have been large, ten of them exceeding 00,000, the contractors' force and equipment have necesarily been likewise. Four chief means have been emloyed in hauling materials. About one-third of the mateials required to construct the 90 miles now completed ave been delivered by teams, another third by indusial railway, and the remaining third about equally by otor trucks and traction engines. Each method apears to have its sphere of adaptability, but it is not the me for all.

The traction engine train is perhaps the least adjustable varying conditions. It appears best adapted to fairly vel, straight roads, which have not been paved, where e average haul is not less than one-half mile. The cost hauling by this method on this work was about 24 nts per ton-mile.

The team haul disclosed no new results, though a great deal of material was handled in this way.

Hauling by motor trucks was quite successful and many contractors employed the method. Wet weather was a handicap and trailers were not very successfully employed. The large 7-ton trucks at first employed did not work as well as the lighter 3-ton trucks, and several of the heavy trucks were exchanged for lighter ones. No motor trucks were used where the average haul was less than 2 miles. The cost per ton-mile where the trucks were successfully used was about 14 cents.

In the 24-mile concrete section west of Zanesville and on the 7-mile brick section west of Cambridge, a 3-foot gauge industrial railway was used to transport materials. The two chief troubles encountered consisted in operating over grades which exceeded 5 per cent and in maintaining the track after it had been down over winter. The actual cost of operation and maintenance was about 11 cents per ton mile. The heavy investment for equipment, however, largely offset the low cost of operation.

On most of the work an attempt was made to keep careful cost data. This was only partially successful, but some of the most reliable figures are given by Mr. Waid, as follows:

The average cost, to the several contractors, for grading, was approximately 40 cents per cubic yard. All classes of excavation for drainage structures cost on an average $1.15 per cubic yard. Mixing and placing concrete in the small culverts cost $1.60 per yard. The cost of laying rubble masonry was $1.85 per cubic yard. The labor cost for building forms for the concrete culverts was $1.22 for each cubic yard of concrete. The cost of placing the reinforcing steel in the drainage structures was 55 cents per 100 pounds.

SPRINGFIELD GARBAGE DISPOSAL REPORT

Past and Present Methods of Disposal in Springfield—Factors in Selection of Method—Variations in Amount—Income Obtainable.

The Bureau of Municipal Research at Springfield, Mass., of which J. H. Hutchinson is manager, has recently made public a report upon the subject of disposing of the garbage of that city, with the idea that it may serve as a basis for arriving at a decision upon this point. The report is based upon investigations of methods and results in a number of other cities.

From 1907 to 1911, Springfield disposed of its garbage by turning it over to farmers for feeding to hogs, the city receiving for this an average of $4,263 a year over and above expenses. From 1914 to 1916 the garbage was disposed of by reduction by a private company under a contract that netted a loss to the city averaging $3,971 a year.

In connection with this contract for reducing the garbage, the report states that "The city failed to deliver the garbage that it said it would; the plant was not of a capacity to treat the garbage delivered to it; the garbage was not reduced and disposed of 'in a manner not injurious or prejudicial to the public health'—it was so unsanitary and offensive that an injunction secured by adjacent property owners resulted in its closing operations in the middle of 1916. The company went into bankruptcy, and early in the present year the plant was bought by the city for $5,453.37." For several months after the closing of the plant in June, 1916, the city buried its garbage on the almshouse grounds and a public dump.

This was objected to strongly and discontinued at the end of the year, and since then the garbage has been given to farmers. Much of the garbage is hauled to the State street station, where it is dumped and gathered by farmers; although in the case of certain farmers outside the city, the garbage is hauled to the city limits in city wagons by city teams, and the farmers there hitch their own teams to the city wagons and remove the garbage to their farms, the city horses bringing back the city wagons returned at the same time by the farmers.

The bureau concludes from its investigation that it is not necessary for the city to incur any loss, but states that "Garbage is a commodity for which, in its raw state, there is a demand, and for which purchasers are willing to pay a price. It is also an article that, after being treated by certain processes, may be changed into commodities that have a market value, and from which an income may be received. * * * It should be realized that a city that gives away garbage is giving away that which is of value."

In addition to this matter of revenue three other factors were considered fundamental in a choice of method of disposal: (1) Cleanliness and freedom from nuisance; (2) adequacy for disposal of all garbage produced, and (3) economy of construction and operation. A method that does not promote the health of citizens, and the cleanliness and sanitation of premises is a failure. A method that abates a nuisance in one part of the city and creates a nuisance in another part of the city is a waste of money. A method may be economical in respect to both initial investment and expense of operation, and may bring in the greatest income from sale of products; yet if it is in any respect offensive or injurious to citizens, it is not a proper method of garbage disposal.

Given proper sanitary conditions and results, that plant is best which causes least expense to the citizens; and the bureau concludes that the expense of disposal and possibly even the combined cost of disposal and collection should be entirely taken care of by revenue from the disposal of the garbage.

Adequacy means that the method of disposal must be adequate to handle not only the average amount of garbage from the present population of the city, but the maximum per capita rate of garbage from the maximum population of the city at any time while that particular disposal method or plant is in use. In considering this point, it assumes the life of the plant as being 20 years, and therefore that its capacity should be adequate for the population 20 years hence. The population of Springfield in 1915 was 102,971, and it is estimated that by 1940 the population will be 248,236, which is exactly double the estimated population for the year 1920.

In the matter of amount of garbage, the bureau makes the very interesting statement that, while the amount of garbage produced increased 8 per cent from 1915 to 1916, the amount produced in the first five months of 1917 was 10 per cent less than that produced during the similar period of 1916; this being total amount and not per capita, from which it follows that the amount of garbage being produced per capita this year is more than 10 per cent less than it was a year ago. "The decrease in 1917 is due, in all probability, to the high prices of food stuffs, to the wide-spread agitation for conservation of food stuffs, and to the increased collection by farmers. * * * Without doubt the effect of conservation will continue for a longer period than the war. With the return of normal conditions, however, the production of garbage, both in total and per capita, will again increase." In the matter of amount of garbage the report quotes a number of figures from other cities, most or all of which have previously been given in Municipal Journal, these showing the amount in pounds per capita per year to vary from 157 in New York to 282 in Washington, D. C. That in Springfield was about 240 pounds in 1915 and 251 pounds in 1916, and the estimate of capacity required for the future is based on an average of 245 pounds.

The variation of garbage production with the seasons of the year in the city of Springfield is shown by the accompanying table, which also gives the variations for seven other cities. It appears from this that the maximum monthly rate in Springfield could probably safely be placed at 12% of the total amount, although in Cincinnati the maximum monthly rate reaches almost 14 per cent of the annual:

Seasonal Variations in Amounts of Garbage.

Month	Cleveland Per cent	Columbus Per cent	Cincinnati Per cent	Washington Per cent	New York Per cent	Detroit Per cent	Chicago Per cent	Springfield Per cent
January	7.00	6.28	5.34	7.50	6.30	7.30	5.50	6.89
February	6.00	5.67	5.20	6.60	5.70	5.85	5.30	6.32
March	7.80	6.36	5.16	7.20	7.00	6.60	5.30	6.78
April	7.85	6.70	6.92	7.55	8.10	7.55	6.50	6.83
May	7.50	7.78	6.80	8.45	9.25	8.20	7.40	7.65
June	9.00	7.82	9.08	7.80	9.37	7.90	8.10	7.49
July	8.65	9.40	12.40	9.20	9.55	8.80	10.50	8.41
August	9.60	12.24	12.10	11.70	9.86	10.40	12.40	10.71
September	10.70	12.95	13.80	10.90	10.89	10.10	12.30	11.17
October	9.80	9.20	8.20	8.50	9.18	10.30	10.60	9.66
November	8.30	7.83	7.50	7.40	7.80	8.10	8.60	9.61
December	7.60	7.77	7.50	7.20	7.00	8.90	7.50	8.40
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

The daily rate also shows variations, and from an inspection of the figures for Springfield, it was concluded that the capacity of the plant should be 210 per cent of the average daily production for the year. In this connection the bureau calls attention to the fact that in making the contract between the city and the reduction company which has been disposing of the city's garbage provision was made for a capacity of only 50 per cent excess over the average daily production of the year previous to the contract, and 25 per cent in excess of the average daily summer delivery of the previous year; provisions which it believes to have been quite inadequate.

The report discusses the advantages and disadvantages of the several methods of dumping on land, disposal by sanitary fill, burial, plowing into the soil, incineration, reduction, and feeding to swine. All of these have been discussed several times in Municipal Journal. In connection with incineration, it was concluded from the facts available that the lowest probable cost of disposal of garbage by incineration is $1.50 per ton, this including operating cost, maintenance and repair. Concerning the utilization of heat from incinerators for developing power it is stated that the Milwaukee plant earns about $10,00

a year by operating a pumping station, and Minneapolis about $27,000 a year by heating and lighting buildings and lighting streets. The Chicago Waste Commission is quoted as stating that it has not been easy to work out an economical arrangement for the use of steam from incinerating plants because of the infrequency of the period of need of steam by a plant coinciding with the period of operation of the incinerator. In Montreal, where a refuse destructor is used in connection with a municipal electric light plant, the former is operated only at night, when additional power is required by the lighting plant.

Assuming that Springfield could secure an income from the heat of an incinerator plant, it is estimated that it would reduce the expense by from $6,000 in 1920 to $10,000 in 1935, but would leave a net cost of incinerating the garbage varying from $26,000 in 1920 to $33,841 in 1935. Incineration is regarded as sanitary and disposing of garbage without odors, which permits the locating of incinerating plants in the central part of the city and decreasing the length and cost of haul.

As to reduction plants, the report states that "In theory reduction plants should be operated in a sanitary manner, without creating a nuisance and without carrying offensive odors. In practice they are not so operated." Of 21 cities containing reduction plants of which inquiries were made, 8 did not report as to odors; 10 reported the presence of odors to a greater or less degree; one did not answer as to this point, but stated that the plant was 40 miles from the city, and one city reported no odors, although Springfield officials visited this plant and noted odors coming from it. Four of the cities questioned operate their own plants, and all of these report odors.

The cost of reduction plants is given as varying between $1,500 and $3,000 per daily ton capacity, averaging $967, omitting one of the plants, which cost $4,400. Estimating the cost of operating the reduction plant at $2 per ton, and charging depreciation on a 20-year life and interest at 3½ per cent, it is estimated that the total expense would be $45,283 in 1920 and $69,568 in 1940. Cleveland reports a profit of $1.49½ per ton of garbage; Columbus, $1.836 per ton, and Dayton, 63 cents. Based on present prices, the bureau believes that $3 per ton would be a fair amount to use in figuring revenue from a plant at the present time and for the next few years; on which they calculate a net profit of $329 in 1920 and $21,659 in 1940.

After citing experiences of a number of cities in selling garbage to farmers or others who use it in feeding hogs, and especially the city of Denver, in which the company receiving the garbage collects it for nothing, it believes it possible for Springfield to obtain at least $1 per ton for its garbage. Worcester and Brockton, Mass., and New Haven, Conn., are cited as cities that operate municipal farms, where garbage is fed to hogs, and it is stated that Worcester derives from its pig farm a revenue of $6.85 per ton of garbage, based on present prices. An estimate based on prices of a year or two ago gives $3.65 per ton.

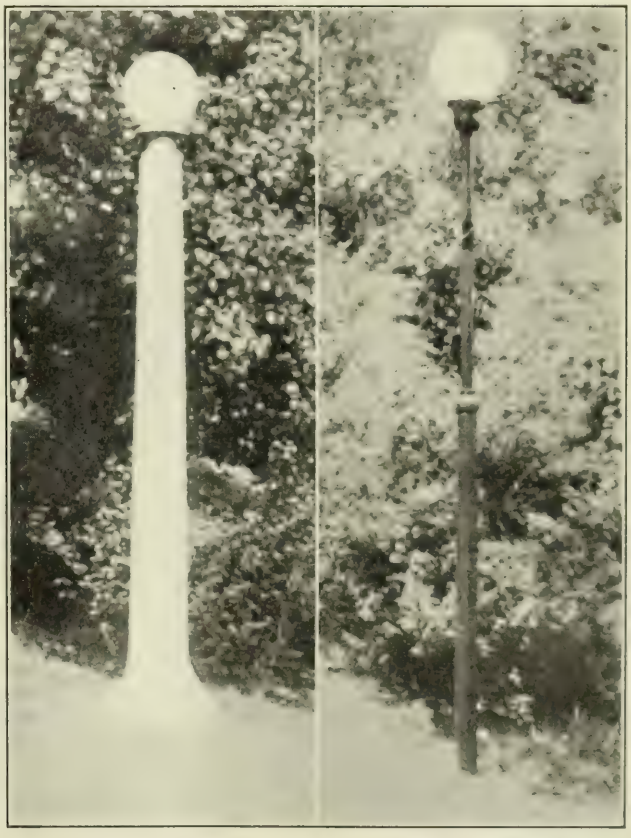
Among the cities which turn the garbage over to hog raisers the following prices are received for the garbage delivered: Grand Rapids, 45 cents per ton; Lowell, $1.25 a load; Somerville, 80 cents per cord foot; Cambridge, 70 cents per cord foot; Colorado Springs' garbage is collected, and $1,440 paid for the privilege, estimated at a total value of $11,040; Denver has the garbage collected for nothing, a service estimated to be worth $64,500.

In conclusion the report suggests that the city might advantageously dispose of its garbage by incineration, by reduction, by selling to farmers, or by feeding to hogs on a municipal farm. Whatever the method of disposal, the city should realize that it can receive a revenue from the garbage rather than paying for its disposal, and at the same time can insure that the process shall be sanitary and inoffensive. "This means that the garbage will not be incinerated, because no city has been found where the revenue of an incinerating plant has met even the direct cost of operation, without considering charges for interest and depreciation. It means also that the city will discontinue giving to farmers that for which they should pay. If farmers desire to have the garbage of Springfield they should pay to the city of Springfield all that the garbage is worth.

"Finally, it means that Springfield will not consider any proposal whereby it will be required to give the garbage to a concern and then pay the concern any part of the cost of reduction."

PARK LIGHTING IN ST. LOUIS.

The water department of St. Louis has recently improved the lighting in the parks and grounds near Chain of Rocks, Baden and Bissell's Point, by installing 80 one-lamp standards equipped with Mazda lamps. The lamps are all on single-light standards of which 53 are of reinforced concrete and 28, in the park, are of wrought iron pipe. The former, eight feet high, square in section with chamfered corners, made by employes of the department, were cast in wooden forms two at a time, the concrete ingredients being two parts Meramec sand, screened to remove particles over one-eighth inch in size; four parts of crushed limestone, three-quarter inch and smaller; one part of cement and ten pounds of hydrated lime per sack of cement. The forms were removed after 24 hours and the surface rubbed to an even finish. The reinforcement was four five-eighths inch deformed bars. The wires are run in a conduit through the center of the post. Each standard was set in concrete poured after the post was placed, anchorage



Concrete Standard. Steel Standard.
LAMP STANDARDS, CHAIN OF ROCKS PARK.

being secured by the reinforcing bars in the post extending down two feet into the footings. Each standard is provided with a cast iron cap and fitter, aluminum bronzed, which holds the 100 or 200-watt Mazda lamp and the 7- by 14-inch globe.

The iron standards, all made by the city, are of three-inch wrought iron pipe seven feet long and one 1½-inch pipe 3.5 feet long, connected by a standard reducing coupling and capped by a malleable iron fitter which holds the 100-watt Mazda lamp and the 6 by 12-inch globe. Each post is set in concrete, so that the center of the globe is 9.75 feet above the ground. The cost of each concrete standard, complete with fitter, globe and lamp was $11.28; of each iron standard complete, $5.82; no setting charges being included. All lamps are on 110-volt alternating current circuits, there being 19 circuits in all, seven lamps ordinarily being placed in parallel on a circuit. All wiring is in lead covered cable placed about 21 inches underground and protected by one-inch plank. Under roadways and wherever much digging will be done, fiber conduit laid in concrete is used. The total cost of this work has been $6,580, and it is estimated 60,000 kilowatt-hours of current will be used in operation during a year.

LOW WATER CONCRETE BRIDGES.

In the arid region of the southwestern states the bridge engineer encounters a peculiar condition. Practically all creeks and smaller rivers are dry eleven months out of the year and in the remaining one month carry an excessive amount of water only for a day or two at a time. A stream will suddenly change its character from a mere trickle or a dry bed to a torrent ten to twenty feet deep and then back to its original state in twenty-four hours. It is only in extreme cases that the flood period extends over one or two days.

Such a condition makes a bridge in which two to five thousand dollars has been invested comparatively useless during the greater part of its life and as little money is available for roads and bridges in these regions, economy must be practiced. Moreover, because of the large amount of debris carried by flood water, the floor of an ordinary highway bridge must be above the flood level, which fact necessitates approaches with wing walls and abutments.

Economy has forced engineers to design a bridge which gives service most of the time without too large an expenditure. The result is the so-called "low water bridge."

A low water bridge in its commonest form consists of several short reinforced concrete spans which clear the ordinary dry or low water flow. These spans are carried on piers which rest either on footings if a rock bed is available, or on a concrete slab when the foundation is sand or gravel. In the latter case, an apron or cut-off wall extends into the stream bed to protect the slab from scour.

In the bridge illustrated by the accompanying photograph, the piers rest on a slab 60 feet long placed in the bed of the stream.

During high water these bridges are wholly submerged, therefore guard rails or hand rails are omitted to prevent the lodgment of detritus or suspended matter. In many cases the center of a bridge is lower than the ends.—Concrete Highway Magazine.

LOW WATER REINFORCED CONCRETE BRIDGE OVER SANDY CREEK, OKLAHOMA.

ASPHALT PAVEMENT CARRIES HEAVY TRAFFIC.

The traffic at the intersection of Fifth Ave. and 42nd St., New York, is supposed to be the heaviest in the United States. The Fifth Avenue Association periodically takes traffic counts at this and certain other corners on that avenue, and endeavors to regulate traffic in Fifth Avenue and vicinity so as to use these several avenues to the best advantage of all concerned. One direction taken by such effort is to endeavor to divert to parallel streets those vehicles whose business does not require them to use Fifth Avenue.

According to the latest count taken by this association, 16,960 vehicles of all kinds passed along the avenue between 41st and 42nd Sts. in the ten hours from 8 a. m. to 6 p. m., 8,513 of these being north bound and 8,447 south bound. Included in this number were 1,296 motor busses. At this point the Fifth Ave. roadway is 55 feet wide and is paved with sheet asphalt, 1½-inch top on 1½-inch close binder, with a 6-inch base of concrete, laid in 1913; previous to which year a sheet asphalt pavement had done service for 17 years before requiring renewal. For carrying this heavy traffic the mixture was changed somewhat from the standard, as is shown by the accompanying table.

	Standard	Fifth Avenue
Asphalt	10.5%	11.7%
200 mesh	13	17.3
100 "	13	10
80 "	13	22
50 "	24	23
40 "	11	5
30 "	8	8
20 "	5	2
10 "	3	1

The asphalt used was Trinidad asphalt, and it will be seen that the amount used was a little more than 10% greater than that required by the standard mixture. The aggregate also is seen to differ quite a little, but when taken by groups the difference is seen to be not so great. Combining the 200-mesh and 100-mesh, the standard requires 26%, the Fifth Ave. pavement used 27.3%. Of the 80, 50 and 40-mesh, the standard is 48%, Fifth Ave., 50%; of the 30, 20 and 10 mesh, the standard amount is 16%, Fifth Ave. pavement 11%. It is seen that the greatest difference between the standard and the Fifth Ave. pavement is in the much less amount of 10-mesh and 20-mesh material and the greater amount of 200-mesh material. This is apparently in conformity with the theory that 200-mesh material can not be crushed any finer by traffic and thus forms an indestructible element of the pavement, whereas the coarsest material is in particles which may be broken by the weight of traffic and loosened from the surface of the pavement, thus leaving small pockets in the surface at which disintegration may begin.

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UTILIZING GARBAGE.

The garbage pail as an index of waste of food, and the duty of each city official to reduce to a minimum the contents of the pails in his city was discussed by us editorially in the May 31st issue. A few days ago Mr. Hoover sent a letter to a number of cities asking them to give him figures of the amounts of garbage collected by them recently as compared to those collected during a similar period last year, presumably with a view to learning to what extent waste of food was being diminished. And within a few days the garbage pail has received further attention from the authorities, the Secretary of Agriculture having made two suggestions in the matter. The first of these is the use of garbage for feeding community herds of pigs, as described elsewhere in this issue. The other is the following circular letter addressed to the mayors of all large cities which have no reduction plants:

"This department desires to bring to your attention the matter of the conservation of the garbage in your city. At the present time there exists throughout the world a shortage of both fats and fertilizer materials. This situation promises to grow more serious as the war in Europe continues. It is therefore a matter of prime importance that all available sources of both of these materials should be used to the best advantage. Garbage contains on the average about 2 per cent of grease and about 20 per cent of tankage, the latter having valuable properties as a fertilizer material. Any method of disposal of garbage in large cities which does not recover both the grease and the tankage is uneconomic and particularly deplorable in the present circumstances. We wish, therefore, to urge upon your consideration the advisability of so treating the garbage from your city as to insure the recovery of its valuable constituents. That this may be made a source of profit to a municipality has been proven by numbers of cities in the United States where municipal rendering plants have been erected, and in a number of others, private plants are now operating and paying dividends on the investments. We will be glad to furnish you with any further information at our disposal on the subject, upon request."

A garbage reduction plant is a very expensive one to construct, and it requires several months—possibly a year—to build one. It is not, therefore, a matter to be decided upon hastily, and we advise each city to give careful consideration to all phases of the subject before it adopts such a plan. For instance, the fact that the amount of garbage is known to have been reduced by 20 to 25 per cent this year in several cities very probably means that the fats and other matters in the garbage that furnish the valuable products are being reduced by at least double this percentage—enough, possibly, to wipe out all profit from the process. It was generally believed that utilization of European garbage could not be made with profit during ante-war periods because the Europeans were not so wasteful of food as Americans; and if Americans cease to be wasteful, the same impossibility of profit will obtain here also. We do not believe that even the Secretary of Agriculture would advise cities to go into a losing venture for the purpose of saving an uncertain amount of food waste, with a possibility (a hope, let us say) that the war will be over before the plant could begin to operate. The hog seems to us a more favorable method of utilizing garbage.

AUTOMOBILE TYPHOID.

In the July 26th issue of Municipal Journal reference was made to the danger that typhoid might increase among city dwellers through their drinking, during automobile tours, water which was polluted. That such danger exists is confirmed by an illustration which has just come to our notice. During the months of August, September, October and November, 1916, the typhoid cases in St. Louis were found to have totaled 429, as compared with 162 for the same period of the year previous. An investigation was made to determine the cause, and it was found to be quite certainly proved that the principle cause was the use of water from contaminated wells and springs in the territory immediately surrounding the city by residents thereof who were in the habit of motoring from the city and making frequent stops at the numerous inns and resorts on the main traveled roads. The water supplies at 51 of these places were tested by the bacteriologists of the water division, and in practically every instance B. Coli were found present. Investigation of the individual cases of typhoid developed the fact that almost all of them had drunk the contaminated water at some of these resorts.

WATER CONSUMPTION OF PUBLIC SCHOOLS.

The stand taken by the city of Lawrence, Kan., in requiring the Board of Education to pay for water consumed by the public schools, as described in Municipal Journal last week, is to be highly commended. The claim of the board that this will place an additional burden upon the taxpayers will not stand a minute's consideration. In the first place, all the water pumped and delivered is paid for by the taxpayers, whether as part of the school budget or otherwise.

But much more important is the fact that the total amount so paid for will, in all probability, be reduced by metering the schools and requiring the Board of Education to pay for the water passing these meters. In the majority of cases, if not all, where the matter has been investigated it has been found that schools using water through unmetered connections are wasting it in the most extravagant fashion. In some cases the schools

have been using almost one-tenth of the entire supply of the city. Water in toilets and sinks has been allowed to run continuously week in and week out, while fountains, showers and other uses of water add to the thoughtless but expensive waste. When the meters and water bills have brought this home forcibly to the school board, they have been able to cut the consumption by 75 to 90 per cent.

For this reason it seems probable that, instead of increasing the cost of water to the taxpayers, metering the schools will decrease the consumption and thus lessen the cost. As Mr. Dunmire, head of the water department, says: "Free water and economy can't be found together."

LICENSE FEES IN WISCONSIN CITIES.

The University Extension Division of the University of Wisconsin has collected information concerning the purposes for which a license fee or permit is required by the cities of that state; remarking in connection with its report on the subject that "Undoubtedly many cities can materially increase their revenue either by increasing the occupations licensed, or the amount of the license fee charged, or both."

It secured information from 84 cities, including all but 8 of those of 5,000 population or over. Forty-nine subjects were named by one or more cities as subject to license or permit, which will be named in alphabetical order. In addition, the state requires a license fee of $5 a year for selling cigarettes, $10 for pharmacists' liquor licenses, and $2 for hotels and restaurants.

Auctioneers. Fees charged by the day, $2 to $100 plus 7% of the gross amount of sale. Seven cities charge by the year, the fee ranging from $5 to $300.

Automobiles for hire, $1 to $25 a year.

Bill posters, $1 to $50 a year.

Billiard tables, $1 to $10; one charges $15 for a billiard hall.

Bowling alleys, $1 to $20; only four over $10.

Building within fire limits, $1 by two cities; sliding scale by two.

Building movers, 50 cents to $10 a month.

Circuses, $1 to $500. Twenty-seven charge a minimum of $10 or less, sixteen having a sliding scale. Three charge $100 or more, and eleven a maximum of $100 or more.

Dance halls, six cities only, $1 to $10 a year.

Dogs. Males, $1 to $3; females, $2 to $5.20.

Drain layers, $50 to $10; $5 being common.

Drays, $1 to $5 for a single dray; $5 to $10 for a double dray.

Electricians, $1 to $10 a year; one city, $1 a building.

Entertainments, exhibitions, menageries and shows, $1 to $50 per day.

Excavations of streets and sidewalks, 50 cents to $10.

Fairs, $1 to $25.

Fortune tellers, clairvoyants and astrologists. Prohibited in many cities. In seven cities charges range from $1 to $10 a day.

Hay weighers, 10 cents a load in four cities.

Junk shop, $5 to $25 a year.

Liquor saloons, $200 to $1,000 a year; most of them $500 or under.

Medicine distribution, $1 to $5 a day, and $10 a year.

Merry-go-rounds, $1 to $50 a day; $10 to $25 a week.

Milk and cream, 25 cents to $2; or 10 cents to 25 cents a cow.

Moving picture theatres, $1 to $100 a year; two cities, 20 cents a seat.

Pawnbrokers and loan brokers, $10 to $125 a year. Milwaukee, $5 for loan brokers and $150 for pawnbrokers.

Peddlers and vendors, $5 a month to $50 a day. Several cities charge low rate for peddler with pack, higher for push cart, still higher for horse and wagon, and highest for two-horse team or automobile.

Plumbers, $1 to $25 a year.

Pool tables, $1 to $15 a table.

Runners and solicitors, $1 to $30 a year; one city, $1 to $3 a day.

Scavengers, $1 to $50.

Second-hand stores, $1 to $25.

Sewers, making connections with. 50 cents to $25; or $1 to $2.50 per connection.

Sidewalks, construction of. $1 to $25 per year.

Stands, markets, candy, pop corn, lunch. $5 to $25 a year, or $1 to $3 a day.

Tallyhos. Three cities, $3 to $50.

Theatres, exhibition halls and opera houses, $1 to $150 a year, or $1 to $5 a night.

Transient merchants, $1 to $35.

Vehicles. Three cities charge $5 to $25 for omnibuses, and $3 to $20 for other vehicles.

Water service pipes, persons laying. Five cities charge fees of $1 to $6 for each connection.

No city reported license fees for clubs, dyehouses and cleaning establishments, steam engineers, public garages, or slaughter houses, although these were mentioned in the questionaire; and only one charges for motorcycles, drivers, and storing gunpowder.

EMULSIFIED ASPHALT FOR CONCRETE ROADS

The use of emulsified asphalt for maintaining concrete roads is suggested by H. B. Bushnell, division engineer of the Illinois State Highway Department. He gives as the advantage of this that no heating kettle is required and that the work can be done even when the surface of the pavement is wet, as it is not necessary to have the sides of the crack dry, as is the case when asphalt or tar is used. About a gallon of emulsified asphalt thinned with a pint of water is mixed with a cubic foot of stone chips which, for large cracks, are graded from ¾ of an inch down to dust, and for smaller cracks from ½ or ⅜ of an inch down. Small pebbles and sand also have been used with good results. Experience has shown that the aggregate should be so graded as to reduce the voids to a minimum. The asphalt is poured upon the aggregate and the whole thoroughly turned by hand. The mixture is then poured into the crack and is well tamped to insure against settlement.

The water in the emulsion evaporates after a short time and leaves the crack filled with a water proof mixture of asphalt and stone chips.

RESURFACING OLD CONCRETE WITH NEW.

The road commissioners of Wayne Co., Michigan, last year resurfaced an old concrete road by placing on it a 7-inch surface of new concrete. This construction was believed to be novel and was regarded by the commissioners as an experiment rather than something to be generally advocated, but recent inspection shows it to be in excellent condition and promising to wear well. In addition to placing the new surface, they at the same time widened the road from 16 feet to 20 feet.

The road on which this work was done was a section of Grand River road built in 1910, which had become rough and uneven. It had been built with two-course construction on a crowned sub-grade, the bottom course consisting of 4 inches of a 1:2½:5 mix and the wearing course of 2½ inches of 1:2:3 mix. It had been laid in 25-foot sections with quarter-inch tar paper joints extending entirely through the concrete. This road carried 7,444 vehicles during the week of August 17, 1912, and, as the surrounding territory has built up rapidly, it is believed that the traffic at present is double this.

Concrete was added on each side of the road to provide the additional 4 feet of width, and at joints where the concrete had spalled to a considerable extent the old concrete was broken away to give a bond and new concrete added, with expansion joints left as in the original construction, and the whole top surface of the old pavement was brought to an even grade. Before placing the new surface, the old concrete was sprinkled with water and a mixture of Tarvia A and Tarvia X was sprinkled on while hot, spreading into a very thin layer which was immediately chilled. This layer pre

vented the adhesion of the new concrete surface to the old concrete. The new surface consisted of three inches of 1:1½:2½ concrete, using for the coarse aggregate Michigan trap rock graded in size from ¼ inch to 1 inch, and washed and screened bank sand for the fine aggregate. Reinforcement was used consisting of No. 26 triangular wire mesh. The expansion joints in the top course were made to coincide exactly with those in the bottom course, and were formed by inserting a piece of wood 3x4 inches over the joint and removing this, after the surface had been finished by a Baker automatic finishing machine, and inserting in the joint opening armor plates with expansion felt. The surface was covered with earth which was kept on 12 days and sprinkled daily, and traffic was not permitted to use the road until 25 days after the last concrete had been placed.

POWER AND WATER BUREAU SHOPS OF LOS ANGELES

Municipal Warehouse, Machine Shops, and Central Power Receiving Station—Testing Electric Meters—Rack Holding Five Thousand Meters—Automobile Control.

By C. W. GEIGER.

On a seven-acre tract in Los Angeles, Cal., there has been constructed a municipal warehouse, machine shops, garages, and central power receiving station for the Bureau of Power and Water, for which it is claimed that for up-to-date equipment and efficiency of operation they have no equal in the United States.

All the buildings with the exception of the garage are built of concrete and are absolutely fireproof. The greater part of the surface of the tract is concreted, which eliminates all mud and dust.

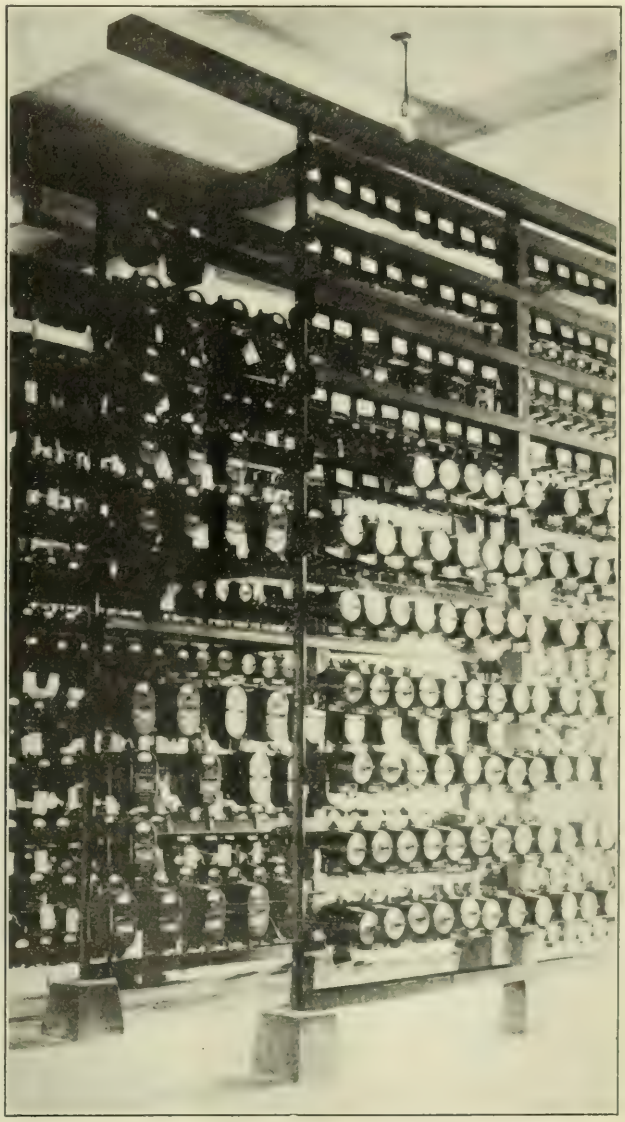
The health and efficiency of the workmen have been taken into consideration, the buildings being all perfectly ventilated and well lighted by both large window space and electric lights, there being twenty-five electric lights installed in the electrical repair department. Wash-basins, soap and towels, clothes lockers, and lavatory are provided and kept in a sanitary condition. The tract is fenced in a part of the way by high retaining walls. Both day and night watchmen are employed. This is very necessary, as a large amount of valuable material is stored on the tract.

A two-story building 80 by 120 feet and equipped with a power elevator is used as a warehouse. A temporary building erected when the aqueduct was in course of construction is also used as a warehouse, while a large quantity of material is piled up in the yard. A spur track enters the building, making it possible to unload directly into the warehouse. A concrete platform extends the length of the warehouse, where much of the supplies are reloaded for transportation by motor truck to other points as needed. At present the warehouse is supplied with sufficient supplies to take care of any ordinary construction work, or to warrant any new construction or repairs. Supplies are shipped here in quantities, and then redistributed to various branches of the organization. This has been found to be the most economical way of handling supplies.

When supplies are ordered for any of the different branches, the foreman of the branch signs a requisition. Five copies are made, and a complete record is kept of everything taken out. One copy is kept by the foreman, two by the warehouse foreman, and two are sent to the main office and kept on file in case any question arises later.

The local offices occupy the front part of the first floor of this building. Immediately over the offices on the second floor is the laboratory, which is one of the most important departments of the ogranization. This department has been equipped with three test benches for testing the accuracy of the meters. The meters are considered the pocketbook of the institution, and special effort is made to keep them in perfect condition. These test benches were built in the electrical re-

WAREHOUSE AND LOADING PLATFORM
At right of picture. Temporary warehouse at left. In foreground, portable reel of 100 ft. of 3-in. fire hose.



PART OF METER RACK HOLDING 5,000 METERS.

pair shop. Five meters can be mounted on each bench at once, thus saving considerable time. Each meter as it comes into the testing room from the warehouse is stenciled by an hair brush with a serial number, class number, and "L. A. City."

After leaving the testing room, the meters are mounted on an adjustable meter rack which has a capacity of 5,000 meters and can be enlarged easily. The meters are slipped over hooks especially designed to fit over the edge of two-inch angle irons. The angle irons are supported by pipes extending from the floor to the ceiling. Meters are fastened to both sides of the angle irons. There are five rows of these racks with 12 angle irons to each rack.

The foreman of the laboratory has designed a box for transporting meters that is a great improvement over the usual method of transportation. Meters are very sensitive and great care must be taken after they are tested not to jar them. Each box has 12 compartments which are lined on all sides with ¼-inch felt packing, in which the meters fit snugly. They are placed in the compartments upside down, which allows the moving elements to remain off the jewels while they are being transported. Considerable other equipment is being installed in the laboratory which will be ready for use soon.

The electrical repair department occupies the upper floor of the machine shop. In this department repairs are made on all types of transformers, motors, and generators ranging from one kilowatt to 5,000 kilowatts. All the switchboards for the substations, and the telephone line that extends the entire length of the aqueduct, were built here. The efficiency of the entire organization is greatly enhanced by the use of this private telephone system.

This department is equipped with two coil-winding machines, used for winding coils for both transformers and motors. A switchboard saw also is installed for cutting into proper sizes slabs of marble and ebonite which are used in switchboards. All three of the last named machines were built by this department, when the workmen were not busy doing other needed work.

An opening is cut in the second floor, and over this is mounted a five-ton crane which moves on a track mounted overhead. This is used for lifting the heavy transformers out of their cases and hoisting them to this floor for repairing and overhauling. Considerable of this kind of work has been done lately. Recently three 250-kilowatt transformers have been completely rewound, and six 600-kilowatt and six 300-kilowatt transformers were dismantled and reassembled so that they could be put in use. This department has also reconstructed two 80-kilowatt and one 100-kilowatt direct-current generators which were rented to local moving picture firms for producing direct current at the studios. The shop was also used to overhaul the electrical equipment of the old aqueduct so that it could be put to service again.

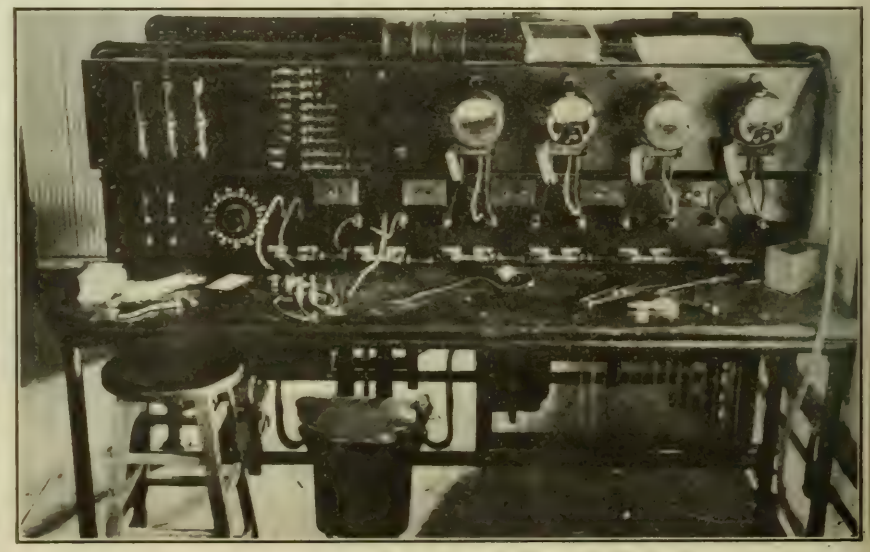
On the first floor of this building is a well equipped machine shop. In this shop at present there are three lathes, one shaper, one radial drill press, two small drill presses, one emery wheel, one power hack-saw, one air compressor, two small cranes operating on a track extending the length of an automobile repair pit, where all repairs are made on the 70 automobiles operated by the power and water department. Just opposite the machine shop is a large garage built of brick. Every automobile (both passenger and truck) reports at the garage every night unless too far away. Each car as it returns at night is checked in and the driver reports the condition of his car, and if any repairs are needed, they are made at once, so that the car will be ready for the driver the next morning.

INTERIOR OF ELECTRICAL REPAIR SHOP.
On either side of the superintendent are the coil-winding machines.

A complete record is taken and kept of each car, such as the amount of work done, the amount of oil and fuel consumed, etc. Each driver signs a slip each morning on taking his car out. A record is taken of the time the driver leaves and returns, the reading of the speedometer when he leaves and when he returns, and a record is made each day of the department the car is working for, such as the shop, service, soliciting, etc.

All these cars are under the direct supervision of what is called the Transportation Department. This department is housed in a special office, built in the center of the yard and equipped with windows extending on all sides. A large blackboard is built in this office for keeping the records of each automobile. On this board is marked each day the number of each car working, the driver's name, the reading of the speedometer in and out, the time in and out, and the name of the department the car works for. At nine o'clock at night, when all trucks are supposed to be in, the record on the blackboard is taken down on cards, and the board cleaned for the records of the next day.

All automobiles are under the control of this department, and are rented out to the Power and Water Departments, with or without the services of a driver.



ONE OF THREE METER-TESTING BENCHES.

At present there are 38 passenger cars and 32 trucks. The trucks are from one to four tons capacity. All trucks are operated on distillate, using gasoline to start with. They consist of Morelands, Autocars, Republic and Vim. The passanger cars are used by the executives, solicitors, trouble shooters along the transmission line, etc.

The most economical record made in operating a passenger car was 2.17c per mile. 1884 miles in one month were made with this car at a cost of $41.24, with an additional $2.36 for overhead expense, making a total of $43.60.

The costs of operating the trucks, including the salary of the driver, vary from 9c to 18c per mile. A four-ton Moreland made the lowest record. It was operated for one month at a cost of $120.13. Deducting $96.00 salary of the driver, it cost $22.47 for fuel and overhead for the month. The truck made 1223 miles, using 210 gallons of distillate and 5 gallons of gasoline. The gasoline was used for starting.

The gasoline and distillate are stored in 500-gallon tanks buried under the ground. All oil and fuel is purchased of the lowest bidder under guarantee.

The tires of the various cars are numbered and checked from day to day. If any new tires are required, the driver must sign for them. Old tires that are worn badly are tagged with the number of miles made on them. If they are beyond repair they are sold to the highest bidder. As the parts of the cars wear out, they are replaced, so that the driver is always assured that his car is in first class condition. Great precaution is taken to make everything and everybody efficient in order to set a good example to the residents of Los Angeles.

The central receiving power station is built on this lot and is of the latest and most modern construction. All equipment is of remote control; that is, the operator has all circuits before him on an operating bench. Here all switches and necessary connections are made. The power comes in at 110,000 volts and is transformed to the voltage necessary for distribution to the various sub-stations and consumers. A part of the north and south sections of the city as well as part of the industrial section is supplied with power, while a line runs to San Pedro and Pasadena. All surplus power is turned over to the Edison company for distribution. For this surplus power the city has received $162,234.20 from May 1 to July 20, 1917.

COMMUNITY PIGGERIES.

The United States Department of Agriculture has made public, probably with a view to encouraging imitation, information concerning a community piggery in Hull, Mass. The commendable feature, from the point of view of the Department, is that pork is produced without the use of grain for feed, thus conserving the grain and produced valuable fat.

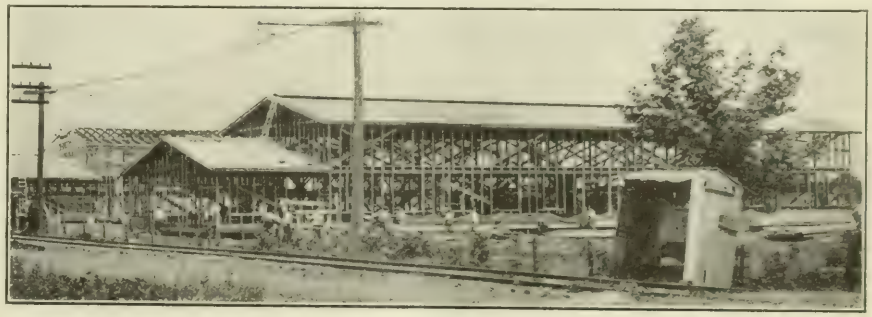
This community piggery of 325 hogs was undertaken in response to appeals for more meat production, and the scheme is reported by the Department and the Massachusetts Agricultural College to be practical.

The town's Committee of Public Safety advanced the money to buy the young pigs, which were taken at cost by citizens. The land for pasturing and housing the hogs was given free, so the only cost was for two large hog houses. One man feeds and manages the entire herd. Each day the uneaten garbage is taken away before any more is fed. All hogs are inoculated against cholera and are kept under sanitary conditions.

When the hogs are ready for market the unit cost of care and feeding will be shared equally by the owners, and this sum plus the original cost of the pig will be the only expense to the owners. The Public Safety Committee is holding a surplus of young sows for breeding, since it plans to continue the system. Citizens of this town extol the advantages of its garbage disposal and recommend it for other places of similar size.

BUILDING THE CANTONMENT AT LOUISVILLE, KY.

At the right is seen the framework of a company barrack; at the bottom a similar one with the siding on. The kitchen extensions are seen at the left of each of the buildings. Plans of these buildings were given in the July 12th issue of Municipal Journal.



Courtesy, Indianapolis News.

The WEEK'S NEWS

State Road Legislation in Pennsylvania and Wisconsin—Washington's Milk Problem—Vacation Typhoid in Iowa—Canton's Water Shortage—Gas Standard Reduction Opposed in Indiana—Penitentiary for Indianapolis Police Chief—City Managers in Portsmouth, Va., and Goldsboro, N. C.—Los Angeles Fires Engineers—The Six-Cent Fare in New York State—Street Railway Strikes in Seattle and Tacoma, Wash.—Norfolk Begins Work on Port Development—Bayonne Does Not Want City Terminal.

ROADS AND PAVEMENTS

Pennsylvania Highway Legislation.

Harrisburg, Pa.—After cutting half a million dollars from the two-million-dollar item for constructing and maintaining state-aid highways in the state highway bill, governor Brumbaugh recently approved the measure. Items approved are: Construction of state highways, $6,000,000, including routes in boroughs where state highway route is improved to borough lines; state-aid highways, $1,500,000; condemnation and purchase of turnpikes and toll-roads, $500,000, some of which will be paid for at once; township "dirt roads," $1,873,470.40, provided that not more than $1,350,000 shall be paid out before June 1, 1918. The bill, as approved, provides for a total of $10,373,470.40. The governor also approved an omnibus bill providing for additional appropriations for a number of extra routes. In signing this measure, he said that the state main highway system should be less than 5,000 miles unless the people bond the state for highway improvements and use all current revenue given to highways for maintenance purposes only. The bill, he said, shows a net increase of 4.1 miles, and he denounced the way routes were added to bills and favorites played in the legislature. The omnibus bill makes changes in twenty-five routes.

Year's Highway Legislation in Wisconsin.

Madison, Wis.—"The legislature of 1917 was signalized by the enactment of more constructive highway legislation than has been enacted at any session in years. The joint highway committee of the two houses gave deep thought to highway legislation and the three joint committee bills which were enacted mark a very distinct advance over previous legislation." This is the statement of A. E. Hirst, engineer for the state highway commission, in reviewing the legislature's work. "The most important enactment was the state trunk highway law (Bill 444, S., Chapter 175). This law was enacted to enable Wisconsin to take advantage of the law providing for federal aid for roads, which federal aid in the period from 1916 to 1920, inclusive, totals nearly $2,000,000. In brief, this law provides that the state highway commission shall lay out a system of 5,000 miles of main highway, interconnecting every county seat and city of over 5,000 in population in the state. This system of roads is called the state trunk highway system and on it must be expended all construction funds (amounting to $6,000,000) available from the federal government, the state and the counties in 1918, 1919 and 1920.

"The State and Federal aid available is divided between the counties, one-third on the basis of area, one-third on the basis of road mileage, and one-third on the basis of valuation. The maintenance of this system after May 1, 1918, is to be performed by the counties under the control of the state highway commission, the funds for the maintenance being provided from automobile license fees, which also furnish the state's one-third share of the cost of construction.

"This law, providing as it does for a comprehensive and well laid-out system of trunk lines for the concentration of construction on this system, and for the adequate maintenance of unimproved portions of the system pending its final reconstruction, should give Wisconsin a system of well maintained roads connecting every important center of population. If well administered, notwithstanding the fact that the funds provided for construction in the next three years are by no means adequate to complete the system, the law will produce a tremendous improvement in practically all of the main lines of travel in the state and will make them travelable with safety and comfort by midsummer of 1918.

"Immediately upon the passage of the state trunk line bill it became evident that many of the towns and counties were deliberately abandoning all projects for construction and maintenance on roads which they assumed would be on the state trunk system. Money previously available for its improvement under the state aid law was moved to other roads in many cases. The joint committee considered this matter and there was formulated and passed bill 650, S., which provides that one-half of the state aid funds available in each county must hereafter be expended on the state trunk line system until this system is completed in each county.

"The bill also provides that towns and villages not served by the trunk line system should receive in proportion to their valuation the other half of the state aid funds, but that the place of expenditure in each town and village should be selected by the county board. The law, together with the trunk line law, provides for a greater concentration of expenditures for the next two or three years on the main lines of travel and at the same time insures that every town and village will get a fair deal by getting less important roads improved if they do not happen to be directly benefited by improvements upon the state trunk line system.

"In addition the laws providing for bonding counties for state aid highway construction were simplified and improved, and while no great activity is anticipated in the bonding of counties during present war conditions, there will be great activity when conditions resume the normal and the legislature has adjusted the county bonding provisions and made them workable by the passage of bill 649, S. Town bonding for state aid highway construction has been eliminated, owing to the impossibility of guaranteeing state aid on town bond issues under the new laws. Bill 590, A., was also passed. This provides that cities of all classes may receive state aid on streets and roads lying in the outlying portions of them. The bill as passed meets the views of the League of Wisconsin Municipalities and will go far toward solving the problem of improvements in the outlying sections of cities, which improvements have been impossible to finance under either the state aid law or under the existing laws for city paving, and it is expected that in a few years the unsightly mud holes on the outer edges of some out cities will be done away with. Some minor changes were made in the common road laws of the state, but none of importance or far reaching effect. In general, the legislature confined itself to the problem of securing the improvement of the main lines of travel, and it is believed that wonderful results were accomplished, especially in improving conditions as to maintenance. The feature of this far reaching legislation was the fact that all of it passed both houses practically without opposition, indicating that the work of the joint committee was well done and met in an adequate and fair manner faults in the present system which were recognized by practically every member."

City Liable for Defective Streets.

Portland, Ore.—Pronouncing a clause in Portland's charter, exempting the city from liability for defective sidewalks or streets, void, the Supreme Court at Salem, in an opinion written by chief Justice McBride, reversed circuit judge Kavanaugh, of Multnomah county, in the case of a suit in which the plaintiff was awarded $6,350 damages against officials for injuries sustained on a crossing over East Salmon street. The officials made defendants in the case were: former mayor Albee, commissioners Bigelow, Brewster, Dieck and Daly, and engineer Dater, and the court held they were not liable as it was not shown that the defectiveness of the crossing was due to their negligence. The decision says: "The city is out of the case

as it stands here, neither party having appealed as to it, but it may well be doubted whether it is competent for the charter-making power to take away from the plaintiff a complete remedy against the city, which is always solvent and responsible, and whittle it down to a point where the plaintiff will have a partial and doubtful remedy against city officers or against a subordinate officer whose position is, perhaps, a little lower than a deputy inspector, and a little higher than that of dog catcher. To the writer it seems that such a conclusion is contrary to justice. This case was begun upon the theory that both the city and the mayor and commissioners, who constitute the council, were liable, the city for the fault of its officers and employes in not using reasonable diligence to ascertain and remedy defects in walks, and the commissioners and city engineer for a like negligence on their part; but in our view, while they might have been properly so joined, the facts which would have justified recovery against the city might not justify a recovery against the councilmen or city engineer. The city, under the doctrine of a respondent superior, would be liable for the negligence of any officer authorized by it to see to the repair of the street, or perhaps, for the fault to designate such an officer. The mayor and commissioners, on the other hand, as heretofore observed, are not liable if they have used reasonable diligence to provide funds for such repairs, and to see that the system of inspection and report of disrepair of walks is provided for and competent persons designated to make such inspections and repairs, unless the defect is so glaring and notorious and so long continued, as of itself to create a presumption of knowledge of its existence, which is not the case here." In absolving the officials from damages the court, in part, says: "There is no charge that defendants were negligent in not providing funds or in failing to provide material, or that they were guilty of negligence in the selection of employes or of a lack of diligence in requiring reports as to the condition of streets. None of these conditions are shown, but, on the contrary, it affirmatively appears that a reasonable diligence has been exercised in all these respects."

SEWERAGE AND SANITATION

Milk Control Obstructed by Litigation.

Washington, D. C.—Washington faces a grave milk problem because of low standards of quality, which threaten a disastrous effect upon the lives of infants, according to a statement by the health department, which declares that much of the milk being sold at the present time is "far below standard" and is "filthy and decomposed." The hands of the department are tied because of the pendency of litigation in the United States Supreme Court with respect to the enforcement of the federal food and drugs act of June 30, 1906. The health officer also is equally helpless, it is stated, with respect to the enforcement of the local milk act of 1895, the fact that a case is pending in the District Court of Appeals, involving the validity of the act, preventing him from proceeding under it or under the regulations made by virtue of it. The only partial remedy available, according to the health department, is for persons who are interested in the quality of milk they use to consult the records of the health department so as to know the standing of their own particular milk dealer. Methods employed at various milk establishments are described in reports of dairy inspectors and made public by the health officer. A bacteriological examination showed that the raw milk used by one establishment for pasteurization, where testing was particularly crude, contained 23,200,000 bacteria per cubic centimeter, with 480,000 bacilli of the colon type and 100,000 streptococci. The finished product, sold as pasteurized milk, contained on the day of inspection 310,000 bacteria per cubic centimeter, 8,200 bacilli of the colon type, and 10,000 streptococci. Bacteriological examinations of the bottles at this establishment, supposed to be ready for filling, showed that they contained large numbers of bacteria. The composite sample of milk taken from twelve cans, each containing ten gallons, showed 970,000 bacteria per cubic centimeter. The sample taken from the dumping vat into which such milk was poured, showed 2,480,000 bacteria per cubic centimeter, and a sample taken from the vat upstairs, to which the milk had been pumped, showed 5,100,000. The bacilli of the colon group, which numbered 6,300 per cubic centimeter in the cans, increased in the lower vat to 71,000 and in the higher vat to 160,000. A quart bottle of "pasteurized" milk from this establishment, filled and capped ready for delivery, showed 78,000 bacteria per cubic centimeter with 500 of the colon type, and 100 streptococci. Concerning another establishment, the inspector reported: "On the day of inspection, on account of the souring of some stored milk and subsequent shortage on the routes, the first milk that arrived was dumped into a bottling machine, immediately bottled and, although it was raw milk, was labeled 'pasteurized' and allowed to go out as such." Samples from a pint bottle of raw milk sold as pasteurized milk showed that it contained 21,100,000 bacteria per cubic centimeter, with 260,000 of the colon type and 100,000 streptococci.

State University Laboratory Fights Vacation Typhoid.

Iowa City, Ia.—The havoc that has been wrought in Iowa in past years by typhoid fever introduced into communities by persons who have acquired the disease by drinking polluted water on their vacations has led the water chemist and bacteriologist for the state board of health, J. J. Hinman, of the state university, to warn all vacationists against drinking untested water. Requests for examinations of such water supplies are being received daily. In a statement, Mr. Hinman said: "The state laboratories do not have authority to examine samples of water from other states, although they may examine, in the interest of public health, any supply within the state. Upon request, however, the names and addresses of the officials who are charged with the examination of water supplies of other states will be furnished, and application for the examination of water collected in their respective jurisdictions can then be made to them."

More Contract Troubles on Passaic Valley Sewer.

Newark, N. J.—Following the recommendation of chief engineer Brown, seizure of the contract held by John G. Tierney for laying the outfall pressure pipes in New York Bay was authorized by the Passaic Valley Sewerage Commission, and secretary Joseph H. Quigg was instructed to notify Tierney to discontinue work at once. Unsatisfactory and irregular progress on the part of the contractor is given as the cause. The work is to be taken over by the sewer board and may be completed by it under the direction of chief engineer Brown, or a new contract let to the lowest bidder. The cost will be charged to Tierney. This action by the commissioners has been theatened for several weeks. Tierney has denied having abandoned the contract, although little, if any, progress has been made this summer. His contention is that, as the work advanced into the bay, he encountered conditions which called for costly foundation work not contemplated when the contract was made. The contract to Tierney was let December 6, 1913, for $437,500. The work was to have been completed more than a year ago. It is said to be about two-thirds finished.

Organizations Unite for Public Health Work.

Fargo, N. D.—The North Dakota Public Health Service is the name given to the organization finally effected in the past few weeks by the state board of health, the state public health laboratories and the Anti-Tuberculosis association. These organizations have repeatedly asked the state legislatures to aid them in the furthering of their plans for more sanitary conditions in the state, but as this help has not been given they have joined forces to carry on the work as far as possible themselves. Plans for the summer include sanitary surveys with the basic idea of preventing typhoid fever and tuberculosis and stimulating towns and counties to employ a city or county nurse. The North Dakota Public Health Service has employed and has at its service for the state an experienced and registered nurse, Miss Mabel Fodness, who has begun her work in the public

health laboratory at the University of North Dakota. She will be especially available for the work of the Federation of Women's Clubs. At the request of the mayor and the local board of health of Park River, the North Dakota Public Health Service has begun a sanitary survey of that city at a cost of from two to four cents per capita. Three men are at work on the Park River survey and five will be added later. The survey will be completed in about a month's time. A house to house canvass is being made, with special emphasis being laid on typhoid, cholera infantum, tuberculosis and all the diseases which are carried by flies or transmitted by polluted water. Placards were placed on unsanitary privies, and large posters warning against the permitting of the breeding of flies were placed in conspicuous places. Two public meetings were held, at which stereopticon lectures were given. The schools of Park River and the dairies have been subject to thorough investigation.

WATER SUPPLY

Purchase of Waterworks Voted Down.

Bayonne, N. J.—The voters, at a special election, have disapproved, by a vote of 2,704 to 2,143, the proposal by which the city was to purchase the property of the New York & Jersey Water Company at a cost of $1,466,848. The company owns only the mains and the opponents of the measure pointed out that the supply is somewhat uncertain as to purity and quantity.

Electrolysis Blamed on Railway.

Trenton, N. J.—That Trenton can be relieved of the expense incident to electrolysis, providing the street railway companies take precautions, and that the latter in turn would be great savers by elimination of this waste of current, is the opinion of E. E. Brownell, the Philadelphia expert. Because of electrolysis, it is claimed the city has been put to enormous expense for replacing water services. The condition is particularly bad along several divisions of the Trenton and Mercer County Traction Corporation, while the Public Service and the New Jersey and Pennsylvania Traction Corporation are also to blame to some extent. However, according to the city commission and the findings of engineer Brownell, the Trenton Trolley Company is the worst offender. He believes that not only will Trenton benefit materially, but the guilty corporations, after repairs have been made, will find that they are saving much money by conserving the current which now escapes and damages city property. The local traction company will not admit its responsibility regarding the damage. Because of the prevalence of electrolysis on North Clinton avenue, the water department is almost constantly engaged placing new house connections. It was stated that in one instance recently a new pipe laid in that vicinity lasted only eight weeks. Owing to the necessity for constantly cutting into the North Clinton avenue pavement to make these repairs, the street surface is in bad condition, but commissioner Fell does not feel like having a new pavement laid, because it would be practically throwing away the property owners' money.

Water Famine Until New Pumps Are Completed.

Canton, O.—With the city in the grip of one of the worst water shortages in several years, mayor Stolberg issued an order prohibiting sprinkling for a period of two weeks. The mayor decided that drastic action was necessary so the city can be furnished with water sufficient for fire protection and to provide all consumers with water for necessary purposes. More than one-third of the city was without water for several hours one night and those districts that were fortunate enough to have water had very little. The condition existing is due entirely to the waste of water by consumers, officials assert. The pressure on this day at noon was down to 70 pounds, and at 7 o'clock in the evening it had dropped to about 16 pounds. In a statement, the mayor said: "The key to the entire water situation here is a distribution reservoir capable of holding at least 24 hours' supply. If council had gone through with legislation for such a reservoir two years ago the city would be safe from any shortage now." The department records show that it is pumping at a rate of about 17,000,000 gallons of water daily now, which is nearly double what it was a few years ago. By the time the ban on sprinkling is raised, however, it is expected that the new waterworks pumping station northeast of the city will be in operation and adding 3,000,000 gallons of water daily to the supply. The station is now practically completed and seven shallow wells have been drilled near the site. Work on the construction of a main to connect the wells with the distribution system of the city is being pushed and it will soon be ready for use. A second new well drilled recently at the Union dam property in the southwest end has been connected with the pumping system. This well has a capacity of about 1,000,000 gallons daily. The first well was put to pumping several weeks ago.

STREET LIGHTING AND POWER

Does Not Have to Rebuild Burnt Plant.

Waterville, N. Y.—The Public Service commission has rendered a decision in the appeal taken by the village trustees of Waterville, declaring that the Waterville Gas & Electric Company will not be compelled to rebuild its plant, which was destroyed by fire September 22, 1916. It is based on the opinion that it would be unjust to compel a corporation to go to the expense of rebuilding its plant when for years it has been doing business at a loss. Public service corporations are compelled at times to furnish service without adequate compensation, but in this case, it is held that an order instructing the Waterville company to resume its gas business would mean that the consumers of electricity would be compelled to assume the expense of the losses on the gas operation. The case came before the commission on a complaint of the village trustees. The village has 1,500 inhabitants, and has been diminishing in population for years. There are no industries, and prior to the fire there were about ninety consumers of gas for heat and light.

Indiana Cities Fight Gas Standard Reduction.

Indianapolis, Ind.—William A. Bond, counsel for forty-one cities in the state, opposing the petition of the Indiana Gas Association for a reduction in heat units required in artificial gas and an added increase of twenty-five per cent in rates, has filed his brief before the public service commission, attacking the jurisdiction of the state commission in the case. Under the petition filed by the gas companies heat units produced by cubic foot of gas would be reduced from 600 to 550 units, thus lessening the quality of the product. This alone would mean an increase of 8¾ per cent in rates. Attorney Bond says the "commission does not have any right, power or authority to determine such matters by wholesale, as no such power or authority is vested in the commission by law, and if it were it would be extremely bad policy to pursue such a course. If the privately owned utilities of the state succeed in getting the commission to act in their behalf by a joint petition to increase rates or modify some service then the letter and spirit of the statute is plainly disregarded and they will have and retain a stronger hold upon the public throat than they held prior to the enactment of the Public Utilities Law. Will the commission become the willing tool of the privately owned utilities of this state, and, by an unauthorized act, smite the public by wholesale and in a matter wholly contrary to the statute?" Bond claims that municipal councils are the proper tribunals to decide on the quality of service to be rendered, as in the reduction of heat units, and that each company be required to file a separate petition before the state body for authority to increase rates. The cities have also protested individually in briefs filed by the officials. The following cities will be affected by the petition for a surcharge on gas bills: Aurora, Bluffton, Bedford, Bloomington, Crawfordsville, Columbus, Connersville, Decatur, East Chicago, Elkhart, Evansville, Franklin, Ft. Wayne, Frankfort, Goshen, Greencastle, Hammond, Huntington, Indiana Harbor, Jeffersonville, Lebanon, Logansport, Laporte, Michigan City,

Mishawaka, New Albany, Ossian, Peru, Princeton, Plymouth, Rich Valley, Rochester, South Bend, Terre Haute, Valparaiso, Warsaw, Whiting, Washington and Lawrenceburg. The following companies have joined in the petition: Consumers Gas Company, Citizens Gas and Fuel Company, Columbus Gas Company, Central Indiana Lighting Company, Evansville Public Corporation Company, Elkhart Gas and Fuel Company, Franklin Water, Light and Power Company, Goshen Gas Company, Greencastle Gas Company, Huntington Light and Fuel Company, Hydro Electric Light and Power Company, Indiana Public Service Company, Interstate Public Service Company, Laporte Gas Company, Northern Indiana Gas and Electric Company, United Gas and Electric Company, Rochester Gas and Fuel Company, Valparaiso Lighting Company, Warsaw Gas Company, Washington Gas Company and Lawrenceburg Gas Company.

An organization of fifteen Indiana cities, to oppose all proposed increases in electric and artificial gas rates, has been formed. John A. Ross, mayor of Seymour, was chosen president of the association of cities. Other officers elected were: Charles S. Barnaby, president of the Chamber of Commerce at Columbus, vice-chairman; Carroll R. Woods, secretary of the Shelbyville Chamber of Commerce and originator of the idea of organizing the cities, secretary; Samuel Spohn, mayor of Goshen, treasurer. A committee of five was appointed to appear before the public service commission at the hearings consisting of D. W. Fickle, former mayor of Logansport; William A. Bond, city attorney of Richmond; Alfred Bavis, president of board of works of Richmond; Samuel Spohn, mayor of Goshen, and John A. Ross, mayor of Seymour. This committee also will employ legal counsel and an engineer to represent the cities in the fight against the increase in electric rates, which is being petitioned for by the utility companies. The following cities have been enrolled as charter members of the association: Batesville, Columbus, Connersville, Frankfort, Franklin, Martinsville, Noblesville, Seymour, Tipton, Mt. Vernon, Winchester, Huntington, Bloomington, Goshen, Richmond, Logansport and Shelbyville. Each of the cities, with their commercial organizations, will appropriate $100 to pay the cost of the fight to be made before the public service commission. In explanation of its request for a 25 per cent surcharge, the gas association makes the following explanation:

"Owing to the scarcity of materials and labor and the extraordinary cost of everything that enters into the manufacture and distribution of gas, it is felt that something should be done to temporarily relieve a situation that has become severely acute and burdensome to a hazardous extent; such condition, unless relief is granted during the period of its continuance, threatens not only the curtailment of present service and efficiency, but as well the ability to finance necessary works betterments, improvements, enlargements and extensions of mains, and if continued for any considerable length of time, actual insolvency of utilities.

"In this connection it is desired to remind your honorable body that the existing burdensome condition is not of recent origin, but that to the contrary the gas companies during practically the last year, and more pronounced during the last seven months, have been compelled to pay unusual and extraordinary prices for gas coal, steam coal, coke, labor and all other materials required for the manufacture and distribution of gas. In the investigation made by the various companies it has been found that they are unable to contract, except at a great advance over normal prices, for these various materials, and from statements frankly made by a number of companies selling such supplies there is absolutely no hope held out for lower prices during the continuance of the war. Even where contracts exist it has been impossible in a great many instances to secure the delivery of the commodities contracted for, necessitating purchasing on the open market to prevent being compelled to close down plants, at prices in some cases as high as the following:

"Gas coal, $6; steam coal, $4.75; coke, $8.50; gas oil, .094 cents per gallon.

"The percentage of increase of prevailing prices over those of normal times of the principal supplies, materials, etc., required to operate, shows an approximate average increase as follows:

"Percentage of increases of prevailing prices over normal prices—Gas coal, 233; coke, 150; oil, 100; steam coal, 189; labor, 30; taxes, 40; firebrick, 80 and cast iron pipe, 84."

Interconnection of English Electrical Systems.

London, England.—Much attention is being given to the investigations and recommendations of the committee appointed by the board of trade to report upon the possibilities of extending and interconnecting various sources of supply and providing economical and convenient electric power for British industries. The full report of the committee is not yet available, but a great deal of discussion upon the subject has recently appeared in the English press. It is suggested that a national power-distribution system is as important as national railway, road, telegraph, and telephone systems, and stress is laid upon the advisability of insuring that there shall be an adequate and economical supply of power for all classes of consumers in the United Kingdom, particularly industries that depend upon a cheap supply of power for their development. The intercommunication of existing municipal electric plants and the establishment of central generating stations are among the questions now being given practical attention. A preliminary statement recently made by the committee of investigation embodies the following conclusions: (1) That when British industry is subjected to the test of keen international competition after the war, its success will depend upon the adoption of the most efficient methods and machinery, so as to reduce manufacturing costs as much as possible. (2) That a highly important element in reducing costs will be the general extension of the use of electric power used in industry that the average output per head, and as a consequence the wages of the worker can be raised. (3) That the present system under which a supply of electricity is provided in a large number of small areas by separate authorities is the result of a policy adopted at a time when the applied science of electrical engineering was in its infancy, and is incompatible with anything that can now be accepted as a technically sound system. (4) That the interconnection of existing supply stations recommended by the board of trade in their letter of May 25, 1916, however desirable in itself, cannot alone meet the requirements of the situation. (5) That a comprehensive system for the generation of electricity, and where necessary reorganizing its supply, should be established as soon as possible.

FIRE AND POLICE

Police Chief Sentenced for Election Corruption.

Indianapolis, Ind.—Chief of police Perrott has been sentenced in the federal court to four years in a federal penitentiary and to pay a fine of $1,000. The policemen convicted, Pope, Sanders, Hulse and Stringer, were treated more leniently, since, though their guilt was undoubted, they "acted under the stress of authority." They were sentenced to six months in the Marion county jail, and to pay fines of $50 each. The sentence of Herman F. Adam, former inspector of weights and measures, was two years and six months in the penitentiary and a fine of $500. Mayor Bell and thirty-one other officials and politicians are facing indictments on similar charges of corruption.

A Rural Fire Department.

Hollansburg, O.—What is claimed to be the first rural fire department in the United States has been put in service at this town, fifteen miles northeast of Richmond, Ind. The company is to serve farmers of Wayne County, Indiana, and Darke County, Ohio, living within a radius of five miles of Hollansburg. An automobile truck of the latest style and equipment has been bought by farmers and will be maintained by annual dues of the membership. If the department is called to extinguish a fire at the home of a member no charge is made. If the call comes from a farmer who is not a member the service will cost the caller $50. The truck is provided with two large chemical tanks, small chemical extinguishers and 200 feet of hose. The machine can make a run within its territory in ten minutes. Five members of the company in Hollansburg who understand the machine's operation thoroughly live within a square of the firehouse and others are nearby.

State Inspectors Find Many Fire Hazards.

Columbus, O.—Fire hazards of which citizens have been entirely ignorant in all communities in the state and in scores of instances endangering big stocks of foodstuffs have been reported by inspectors who have been at work for several weeks to state fire marshal Fleming. More than 1,000 orders to correct evils have been issued through 230 fire insurance company inspectors whose services are

given the state during the period of the war. Almost all the wholesale grocery warehouses, 1,100 grain elevators, 500 grist mills and other food storage buildings have been examined already. In a large building adjoining a large wholesale grocery warehouse with a $25,000 stock of goods the inspectors found a carload of "strike anywhere" matches. They were in an inflammable building. In another large building housing $100,000 worth of foodstuffs the automatic sprinkler system was entirely out of order. Inspectors found 90 tons of peanuts stored in a ramshackle barn about which were all sort of fire hazards. Another bad practice discovered is keeping automobiles in barns stocked with hay. "A barn is no garage. Keep the auto out in a separate building with a concrete floor that is rat proof. Keep gasoline in a safe place," says the instruction from the fire marshal's office.

Fight Difficult Oil Fires.

Philadelphia, Pa.—Two terrific explosions which occurred within fifteen hours at the Point Breeze plant of the American Refining Company resulted in total damages of $700,000 and injuries to scores. The second explosion occurred while the firemen were still at work. The detonation rocked the southern section of the city. When the second explosion occurred more than a dozen fire companies were still pouring powerful streams into the tangled mass of hot iron left by the morning fire. The second call drew back many companies which had just returned to their stations from hours of heroic battling with the first fire. About twenty-five ambulances treated firemen during the day. The second explosion occurred in one of the stills in the same region which had been burning all morning. The still which exploded contained about 10,000 barrels, or 420,000 gallons, of oil. The plant's facilities enable the removal of products when occasion requires to points inside of the works, distant from the fire.

MOTOR VEHICLES

A New City Garage.

Akron, O.—The city council, in passing the semi-annual budget, has provided for a city yard. The city yard will contain a garage for the repair and storage of city autos. Gasoline which has hitherto been obtained simply by requisition at any garage and charged up to the city will hereafter be obtainable only at the city garage by city coupons. Mileage reports will be made at regular intervals and by means of them steps will be taken to prevent joy riding in the city-owned machines.

Rebuilt Truck in Service.

Oak Park, Cal.—The new rebuilt fire truck has been delivered to the local fire station on Fourth avenue and is now in service. The apparatus consists of motor tractor and truck equipped with ladders, hooks and chemical tank. It was rebuilt at the corporation yard under direction of the chief.

New Truck Installed.

Chester, Pa.—The Franklin Fire company, of this city, has now in service the new 10,000 gallon Seagrave centrifugal combination motor pumping engine and hose car. The machine is equipped with Sewell cushion wheels and a complete fire-fighting outfit. Under the direction of John T. Bauer, chairman of the purchasing committee of the fire company, the engine was given its official test pumping water from the Delaware river. With a suction lift of 12 ft. 3 in., the centrifugal pump gauge showed 120 lbs. pressure and four full streams of water were discharged through four 100 ft. lines of 2½ in. hose in 22 seconds. Through four lines 100 ft. each, 2½-in. hose, siamesed into a deluge set with 2-in. nozzle, net pump pressure 120 lbs., nozzle pressure 90 lbs.; 1,128 gal. of water was discharged per minute; suction draft 12 ft. 3 in. Through four lines of 2½-in. hose 100 ft. each, each having separate nozzles, sizes 1 inch, 1⅛ inch, 1¼ inch, 1¼ inch, 1,168 gals. of water was discharged per minute, at 120 lbs. net pump pressure, suction draft 14 ft. 4 in. Through three lines of 2½-in. hose, each 100 ft. siamesed into a water tower, 1¼-in. nozzle, 200 lbs. net pump pressure, nozzle pressure 170 lbs., gallons discharged 771, suction draft 10 ft. Through four lines of 2½-in. hose, nozzles 1 inch, 1⅛ inch, 1¼ inch, 1½ inch, pump pressure net 100 lbs., suction draft 6 ft. 5 in., 1,397 gal. of water was discharged per minute.

GOVERNMENT AND FINANCE

New City Manager Appointed.

Portsmouth, Va.—W. B. Bates of Roanoke, Va., has been appointed city manager of Portsmouth for a term of three years beginning August 1, 1917, at a salary of $4,000 to begin with for the first year. He received the votes of councilmen Bunting, Claude, Hanvey and Herbert. Councilman Culpepper voted for P. L. Looney of Norfolk and councilmen Morris and Dashiell voted for T. B. Shertzer, the former city manager, whose dismissal had caused indignation throughout the city, to fill the position for the coming five months. Mr. Bates, who is 37 years old, was born in Richmond. His present residence is in Roanoke, although he has been employed for some time in Richmond. He is an engineer, connected with the Southern Steel Products Company of Richmond, and was assistant city engineer in Richmond for several years, going from there to Roanoke, where he was made city engineer. Meanwhile the citizens' disgust at the action of the council majority in dismissing city manager Shertzer has taken active form. Judge Kenneth A. Bain has granted a petition signed by 586 qualified voters asking a special election to decide on the incorporation of the recall feature in the city charter, with a view to the recall of the council members. An election is to be held September 18. As a mark of confidence and appreciation, a handsome gold watch was presented to Mr. Shertzer by several hundred citizens before he left the city.

A Woman Mayor in the South.

Moorehaven, Fla.—Mayor Marion N. Horwitz, the first woman to hold such a position in the South, has taken office after making a strong fight against her own election. She finally accepted the office after receiving 75 per cent of the votes cast at the election recently. She has been strong in her stand against a woman holding public office, but was the sole nominee for the mayoralty, and a delegation of the leading citizens pleaded with her to accept the office, presenting a petition which had been signed by a majority of the voters. Mrs. Horwitz has announced to the new council that she stands for progressiveness, elimination of party lines in municipal politics, and a referendum on all legislation of a municipal character, sanitation, schools, police regulation, and the proper and immediate financing of the new city of the Everglades.

Propose Municipal Loans to Industries.

Portland, Ore.—That the city under the state constitution is prohibited from advancing money to finance any privately owned manufacturing industry is the opinion submitted to the council by city attorney LaRoche. This opinion was given as a result of a request made some time ago by the East Side Business Men's club that the city issue bonds to raise funds for loans to manufacturing industries in this city. Commissioner Kellaher, of the department of finance, made the statement that he favors an amendment to the state constitution authorizing cities of 100,000 population or more to issue industrial bonds for the purpose of assisting manufacturing plants within their boundaries. Mayor Baker referred the matter to commissioner Kellaher, who will act with city attorney LaRoche in the preparation of such an amendment.

Shakeup in Engineering Department.

Los Angeles, Cal.—The reorganization of the city engineer's department has been ordered by the board of public works with an initial reduction of thirty men in the staff, effective August 1. Further changes will be announced later to go into effect September 1. In addition to dropping thirty positions, with a saving of more than $30,000 a year, the board designated R. W. Stewart, chief engineer of bridge and tunnel construction, as office engineer, to have charge of the general conduct of the drafting de-

partment without increase in pay. Stewart will take over many of the duties formerly performed by city engineer Hansen when he was chief deputy. The first reductions ordered in the engineer's department were as follows: Street planning department, eleven men, leaving twenty-five in the department; sewer planning department, nine men, leaving fifteen; storm sewer department, one man; bridge department, one man; surveying department, two field parties numbering eight men. Three small autos will be purchased to make it possible for the remaining twelve field crews to do the work of the present fourteen crews. Action follows the removal from office of city engineer of Homer Hamlin by the board. Hamlin had been asked to resign but he refused. The board in a statement said: "We recognize that he gave the city valuable service during the past years. However, we were convinced that the time had come for a change. In recent months there has been an entire lack of harmony between the engineer and the members of the board." The real cause of the trouble is attributed by Mr. Hamlin to have been his refusal to accept a macadam pavement because of the contractors not complying with the specifications in regard to stone used. The board disagreed—but the pavement, which the board accepted on Jan. 4 last, is already disintegrating.

City Manager Appointed.

Goldsboro, N. C.—Edward A. Beck, of Pennsylvania, has been selected by the Goldsboro board of aldermen to fill the position of city manager, at a salary of $275 per month. He will assume his duties September 1. Mr. Beck is a graduate of Purdue University.

Budget Board Makes Investigation.

Lansing, Mich.—Michigan's budget commission chosen by Governor Sleeper to investigate the system of accounting for the state and report its findings to the next legislature, is proceeding with its work. Three of the members have attended important meetings in the upper peninsula. The entire commission is now travelling through New York, New Jersey and Maryland, to see how the budget systems of those three states work out. One of the most important problems in state institutions for the last few years has been the question of the purchase of supplies. For a time each institution bought its own stuff, independent of the others. Soon it was found that exorbitant prices were the result. To obviate this difficulty, the stewards of the institutions voluntarily organized an association known as the Institutional Buyers' Association. Co-operation brought down prices and secured better results. Commissioners Hinkley, O'Brien and Lord went to investigate the association's methods at a meeting held in Marquette. Secretary George Lord of Detroit, of the commission, plans to keep open house at the offices of the commission here in the capitol for two or three days a week. Commissioner O. C. Tompkins, the Lansing member, will be here at all times.

TRAFFIC AND TRANSPORTATION

Commission Has Power to Raise Fares.

Albany, N. Y.—The Public Service Commission has decided that it has the power to permit up-state traction companies, which could demonstrate that the five-cent fares were not resulting in a reasonable return on the capital invested, and which were not bound by franchise agreements or special legislation, to increase trolley faces to six cents. The commission did not pass upon the question of whether it had jurisdiction in cases where special legislation or franchise agreements are held to be a bar to its authority. It merely determined the one question that it had authority to raise rates, notwithstanding the five-cent limitation in the general railroad law. The applicatons now being considered are those filed by companies operating in Newburgh, Peekskill, Ossining and adjacent territory. The commission issued the following statement: "In regard to the method of procedure in cases to be taken up in accordance with the foregoing, and in cases which may be taken up in pursuance of further determination which may be made by the commission as to its jurisdiction in any of the pending applications, the commission states that the burden of proof is upon the railroad corporations to establish that the present maximum rates are unjust and unreasonable and that with due regard among other things to a reasonable average return upon the value of the property actually used in the public service and to the necessity of making reservation out of income for a surplus and contingencies the proposed rates properly should be approved and fixed by the commission as just and reasonable." Meanwhile many briefs have been presented by cities affected by the increase.

Rochester, through corporation counsel Benjamin B. Cunningham, claimed that not only has the Public Service Commission no power in the case, but that even the legislature cannot alter the trolley fares here, as the Constitution prohibits it.

Mr. Cunningham cited two Court of Appeals decisions to show that a municipality has the right, and that it is its duty to bargain with a corporation for fare rates. "In Wilcox vs. Richmond Light and Power Company," says Mr. Cunningham, "it was held that local authorities, in granting consent, have the power to regulate rates of fare as conditions, the court saying: 'Not only was the insertion of the five-cent transfer clause a wise and prudent provision, but the omission of such protection would have worked grave injustice to the people.'" "There is no doubt," says another decision which Mr. Cunningham quotes, "that the rate of fare to be charged to and from points in the village, was a matter of such municipal and public interest that the municipal authorities might bargain with reference thereto. Therefore, the grant of the new franchise on the condition and consideration, amongst others, of a five-cent fare between the points now involved and the acceptance by the company thereof and its agreement to observe all the conditions, regulations and restrictions thereof made a valid contract." The case of Willis vs. The City of Rochester is also cited by Mr. Cunningham. In that case it was necessary that the court should find that the regulation of fares was a matter of municipal concern, and the court did hold that "a rate of fare is a matter of municipal and public interest." For the second point of his brief the city attorney holds that the right to fix rates of fare is derived from the Constitution and not from the Legislature, and it is therefore beyond the power of the Legislature itself to alter such rates; "that the Legislature cannot confer upon the Public Service Commission power which it, itself, does not possess." Section 3 of Article 18 of the Constitution provides that the construction or operation of a street railroad shall not be authorized by the Legislature "except upon condition that the consent also of the local authorities having the control of that portion of a street or highway upon which it is proposed to construct or operate such railroad is first obtained." Mr. Cunningham cites a Court of Appeals decision in which the court says: "The municipal authorities granting this consent derived their power directly from the Constitution, which forbids the Legislature from enacting any law authorizing the construction or operation of a street railroad except upon condition that the consent of the local authorities be first obtained."

Rochester was the only city which objected on the ground of special legislation. The municipalities which advanced franchise agreements as a bar to the commission's jurisdiction were Auburn, Glens Falls, Amsterdam, Schenectady, White Plains, Little Falls, Oneida, Troy, Greenburg and Scarsdale. Other cities reserved the right to present oral arguments on the subject when their individual cases are called. Ogdensburg claimed it was an exception by reason of a contract between the railway company and the St. Lawrence state hospital. Oswego objected because its representative declared that prior to its railroad service being absorbed by the Empire State Railways, the local company was making an adequate return on the capital invested.

New York's Last Horse Car Really Goes.

New York, N. Y.—After several years of threats or promises, the last horse car has finally made its last trip in the city. Members of the public service commission and officials of the New York Railways company turned out to participate in the trip. Line after line of horse cars had been abandoned or replaced by electric lines in the past until only the Bleecker street line of the Bleecker Street and Fulton Ferry Railroad company, a subsidiary company of the New York Railways company, remained in the metropolis. Traffic on this line has been dwindling for some years, and recently the directors of the company voted to abandon the line. For several years the line has been operated with but a single car, which made trips back and forth at a losing business. The company says that in the fiscal year 1916 it carried 3,576 cash passengers and 1,045 transfer passengers, with total receipts of $178.80, the total receipts for the fiscal year 1917 falling to $103.60. On one day this month the total receipts of the car for the entire day were 10 cents. The commission was represented on

the last trip of the pioneer street car by commissioners Travis H. Whitney and Charles S. Hervey; Judge William L. Ransom, counsel; James B. Walker, secretary; George F. Daggett and Arthur McKinney, assistant secretary; and William G. Whiston, electrical engineer.

The Auto Headlight Problem.

Austin, Tex.—Representatives of ten firms manufacturing or dealing in various kinds of automobile headlight dimmers have signed an agreement with the state highway commission that they will abide the result of a scientific test of the merits of the different kinds of dimmers which will conform to the requirements of the law. These tests are to be made in the laboratory at the university under the supervision of Charles A. Duren, state highway engineer. The report of the tests will be made in writing to the commission; this report will be on file with the commission and will be available to anyone who desires to examine it. It is not the purpose of the commission to advertise any particular kind of headlight dimmers to the detriment of other kinds, but the merits and demerits of each dimmer tested will be clearly stated in the official report to be made.

Work on Madrid Subways.

Madrid, Spain.—Work on the Madrid subway system has now been in progress for three months in the Puerto del Sol, which is the center of the Madrid business district. The engineers in charge propose during the summer to begin similar construction work in eight or ten additional places along the line of the proposed subway and it is calculated that the total number of workmen engaged in this connection will approximate 3,000. The period within which it is expected the construction of the subway proper will be completed is fixed at 18 months from the date work was first commenced and it is expected that another six months will be occupied in laying the rails and completing the stations.

Street Railway Strikes Ended.

Seattle, Wash.—The strikes of the employes of the Puget Sound Traction, Light & Power Company in this city and Tacoma are now ended and cars have resumed operation after more than two weeks of practically no service. Following an alternative writ of mandate by court, directing the company to resume operation, it made an attempt to operate two cars on the downtown streets. A crowd of strikers and sympathizers surrounded the cars, and bombarded them with bricks, rocks and other missiles. The windows in the cars were broken, and the motormen and conductor were badly injured. A second attempt the next day met with the same reception. Following the riots the company applied to federal court judge Neterer for an injunction restraining strikers and others from interfering with the operation of its cars. Judge Neterer stated that the situation called for executive action, not judicial, and denied the injunction. The company's petition asked that a sufficient number of U. S. marshals be appointed to protect the company and its employees. Judge Neterer, in his opinion, stated that the company was asking the federal court to do what should be done by the executive branch of the state and city, or in other words to "police the city." He declared that this was not the proper function of the court. When mayor Gill and police chief Beckingham detailed police to protect the cars a number of policemen struck and refused. They threatened to form a union to resist. Fifteen policemen were discharged and have not been reinstated. The municipal railway reaped a harvest on some lines. Passenger revenues, which have ranged from $38 to $45 a day for several years, jumped to about $340 daily. The jitneys, which were in the usual process of regulation, also did well during the strike. Through the efforts of the King County Council of Patriotic Service, the strikers' general committee was induced to agree to a conference at which five men from Tacoma, five men from the Seattle force, and the officials of the Puget Sound Traction, Light & Power Company, including A. W. Leonard, president; A. L. Kempster, manager at Seattle, and Louis H. Bean, manager at Tacoma, were present. The men are to be permitted to organize and affiliate with any union. The company agrees that there shall be no discrimination against union employees, and the men agree to work with non-union employees. The company agrees to reinstate the discharged Seattle employees. The seven discharged Tacoma employees will be reinstated providing the arbitration board of Tacoma railway sees fit. The settlement of matters relating to wages and working conditions will be submitted to an arbitration board consisting of Dr. Henry Suzzalo, C. J. Franklin, representing the company, and James A. Duncan, representing the employees. The findings of this board or a majority of it are to be effective from Aug. 1 and to be binding on the company and the employees for one year.

Tacoma, Wash.—A suit to compel the Tacoma Railway & Power Company to resume service was brought to the Pierce County Superior Court by the state public service commission and the city. In addition to the Tacoma Railway & Power Company, between 200 and 250 of the strikers including the seven men whose discharge by the company precipitated the strike, were named as respondents. The employees were made parties to the action in order that they could state their side of the controversy. Charging conspiracy and intimidation, the Tacoma Railway & Power Company, in connection with the suit brought by the state public service commission, filed in the Superior Court injunction proceedings against F. A. Hoover and Edward McMorrow, international organizers of the Amalgamated Association. The company charged in its complaint that union organizers entered into an unlawful conspiracy to compel its employees to cease working, and by threats of violence and other methods of intimidation induced a large number of men to go out on strike. The agreements, however, terminated the troubles.

MISCELLANEOUS

Proposed Municipal Terminals for Norfolk.

Norfolk, Va.—With the letting of the first contracts work is to be begun at once on the city's municipal terminals, according to an announcement by city clerk Robert E. Steed. The board of dock commissioners has published the report on the proposed development near Sewalls Point following a study of the plan by B. F. Cresson Jr., consulting engineer. The location of the terminal is decided upon in a contract between the city and the Norfolk & Portsmouth Belt Line Railroad. The four problems studied in the report are: (1) The best scheme for progressive development of the 2,400 feet front. (2) The character of construction of the first unit (required by the contract with the railroad). (3) The mechanical appliances for the most economical handling of merchandise. (4) The briefest possible time for construction. The main purpose of the board is "to provide a place to which all railroads shall have equal access to connect with foreign steamers to assemble export cargoes, or receive their respective proportions of import cargoes, and where independent lines of foreign or coastwise steamers which may hereafter come can be accommodated without the necessity of having their own terminals." The property which the city has acquired for development includes a strip of 500 feet in length outshore of the low water line, which was donated to the city on condition that it build a dock on it within two years. The total frontage on the low water line is about 2,400 feet. The site contains about 75 acres of land under water and 148 acres of upland. The comprehensive plan worked out by Mr. Cresson divides the property into four districts or zones: (1) A waterfront zone for the interchange of commodities between rail and water carriers and for the storage of these commodities in transit. (2) A warehousing zone. (3) An industrial zone, and (4) A residential section. In the proposed development, railroad tracks lead to all the piers, to all the warehouses and to the industrial areas. Five piers are contemplated, ranging in length from 1,700 feet to 1,800 feet, each with a single story steel shed. Over a portion of these piers a second story is provided for use in connection with an immigration station, and for the general handling of passengers. The southerly of these piers is 150 feet wide and the other

are 175 feet wide. The slips between the bulkhead are 275 feet wide and at the pierhead line are about 330 feet wide. A grain elevator is planned with a conveyor leading to the sides of the two southerly piers for the direct unloading of grain into ships. The northerly pier is shown as an unshedded pier with railroad tracks covering the outer portion with conveying machinery for the handling of heavy commodities between rail and water carriers. This provides for the direct unloading from the one to the other. The inner portion of this pier is reserved as storage room for heavy commodities which do not need protection from the weather. In the warehousing zone four warehouses are shown in the plans, each eight stories high, 150 feet wide and 350 feet long. These are served by railroad tracks and by a teamway. In the industrial zone four model loft buildings are proposed, each of eight stories, and about 100 feet wide. An additional area is set aside for industrial purposes. The initial unit provides for a pier 150 feet wide and 1,000 feet long. Access from the Government Channel to this pier is contemplated by dredging a 30-foot approach. The type of pier proposed is a reinforced concrete deck on creosoted timber piles and a single deck steel pier shed is contemplated on the outer 500 feet. The inner 800 feet of this pier is planned as a solid filled pier to be constructed later and the whole 1,800 feet to be shedded at some future date. Adequate bulkheading is provided for. Rail connections, water mains and electric light and power transmission lines are to be provided. For the latter items, $46,000 is the estimated cost, while dredging will cost $119,000; bulkheading, $112,500; pier, $225,000, and steel shed, $97,500, making a total of $600,000—the amount appropriated. It is calculated that the pier itself, up to and including the deck, can be built in 210 calendar days. The city has purchased the site of the docks at a cost of $391,430. The contract for the bulkhead has been awarded to Alsop & Peirce, Newport News, Va., and H. P. Converse & Co., Boston, Mass., has the contract for the construction of the pier. The completed installation will provide 1,308,750 square feet of shedded pier area, or slightly more than 30 acres, and 20,380 lineal feet of wharfage, or a little less than four miles. Barton Myers is president of the board of dock commissioners.

Bayonne Votes Down Terminal Project.

Bayonne, N. J.—With about half the voters absent from the polls because of the heat, this city, by a vote of 3,408 to 1,073, defeated at a special election the project of shore front development on New York Bay by the Bush Terminal Company. The terminal proposal was that the city should issue $10,000,000 of bonds to construct piers, storehouses, factories and connecting railroads under an agreement with Irving T. Bush, head of the Bush Terminal Company, which would provide that the proposed terminal plant be built and operated by Mr. Bush, who would divide the profits with the city, the plant at the end of fifty years reverting to the city free of cost. It was expected that in fifteen years the interest and sinking fund charges on the bonds should be so reduced that Bayonne would have an annual income of $1,000,000. The proposal included a terminal for a passenger and a vehicular ferry connecting with Manhattan. Bayonne business men formed a Bayonne Terminal Publicity Committee to educate the residents on the advantages of the proposed terminal, which had the indorsement and support of governor Edge and United States senator Frelinghuysen, but was hotly opposed by mayor Garven. One of the chief arguments against the proposal that apparently had weight with the voters was that the new terminal would attract an influx of cheap labor, which would be undesirable.

Plan Municipal Hotel.

Palto Alto, Cal.—The advisability of this city promoting and managing a municipal hotel has been practically agreed upon at a joint meeting of the city council, board of public works and city planning commission, and action taken to have plans of a building submitted for consideration by the board. Mr. Cheney, the city planning consultant, called attention to the necessity of having such improvements as may be made conform to the plans for the development of the plaza entrance that have been adopted by the planning commission and approved by the council. Prof. C. D. Marx moved that the meeting recommend to the council that plans be prepared and estimates made for the erection of a municipal hotel on the leased land and also plans and estimates for the improvement of the plaza entrance in accordance with the designs adopted. The motion was carried and representatives of the chamber of commerce pledged that organization to support the project enthusiastically. To carry out the suggested project would require a bond issue in such sum as would be found necessary, possibly from $50,000 to $100,000.

TERMINAL, PORT AND INDUSTRIAL DISTRICT DEVELOPMENT PLANNED FOR NORFOLK.

THE MUNICIPAL INDEX

In Which Are Listed and Classified by Subjects All Articles Treating of Municipal Topics Which Have Appeared During the Past Month in the Leading Periodicals.

It is our purpose to give in the second issue of each month a list of all articles of any length or importance which have appeared in all the American periodicals and the leading English, French and German ones, dealing more or less directly with municipal matters. The Index is kept up to date, and the month of literature covered each time will be brought up to within two or three days of publication. Our chief object in this is to keep our readers in touch with all the current literature on municipal matters. In furtherance of this we will furnish any of the articles listed in the index for the price named after each article, except that where an article is continued in two or three issues of the paper, the price given is for each of said issues. In addition to the titles where these are not sufficiently descriptive or where the article is of sufficient importance, a brief statement of its contents is added. The length also is given, and the name of the author when it is a contributed article.

ROADS AND PAVEMENTS.

Accounting:

Accounting Form of the Highway Department of Milwaukee County, Wisconsin. 16 ills. 1,500 words. Good Roads, July 28. 10 cents.

Bituminous:

New Specifications of Michigan State Highway Department for Bituminous Concrete Roads. 2,500 words. Better Roads & Streets. July. 15 cents.

Detailed Cost of Bituminous Surface Treatment Work in Philadelphia, 1,900 words. Engineering and Contracting. July 4. 10 cents.

Concrete:

Ohio State Concrete Roads Have New Specifications. 750 words. Engineering News-Record. July 26. 15 cents.

Removal of Excess Water in Concrete Road Construction. Wet mixture is handy to use. Excess water can be removed by proper manipulation. 2,000 words. Engineering and Contracting. July 4. 10 cents.

Wide Roadway of Cleveland Bridge Concreted Cheaply. Form travelers hung from stringers. Concrete delivered on track loop formed by bridge over roadway. 4 ills. 1,500 words. Engineering News-Record. July 19. 15 cents.

Concrete Road Laid in Freezing Weather at Slight Extra Cost. Covered with canvas before initial set. By F. E. Semon. 1,500 words. Engineering News-Record. July 5. 15 cents.

Construction:

Three-Hopper Car Delivers Proportioned Batches to Paving Mixer. Batches made up at stock bins. Industrial railway and three-hopper car take batches to mixer. Motor trucks average 8-mile round trip per hour with 4-yd. load. 7 ills. 1,000 words. The Contractor. July 20. 10 cents.

Cutting Sheet Asphalt with Angle Iron and Road Roller. A scheme for simplifying a disagreeable and troublesome job. Considerable saving in cost. By R. C. Cram. 3 ills. 1,000 words. Electric Railway Journal. July 7. 10 cents.

Emergency Road Construction in Pennsylvania. Trying to make a record of two miles of complete construction a week to serve the military camp at Mt. Gretna. 3 ills. 1,100 words. Municipal Journal. July 26, 10 cents.

Vermillion County Highway Improvements Engineers' and contractors' methods described. By P. C. McArdle, superintending engr. 5 ills. 1,750 words. Municipal Engineering. July. 25 cents.

The Completion of the National Road Through Ohio. From a paper by R. M. Waid, before Ohio Engineering Society. 15 pages. Journal of the Ohio Engineering Society. $1.00.

Road Construction and Improvements by Means of Town Planning Schemes. Views of municipal and county engineers. 9,000 words. The Surveyor. June 8. 40 cents.

Convict Labor:

The Honor System in the Use of Prison Labor in Construction and Maintenance of Public Highways. By F. M. Williams. 4 ills. 2,000 words. Better Roads & Streets. July. 15 cents.

Design:

Alignment, Grades and Cross-Sections. Address delivered by W. J. Carrell. 2,000 words. Better Roads and Streets. July. 15 cents.

Ohio Practice in Widening and Superelevation of Pavements on Highway Curves. 1 ill. 1,000 words. Engineering and Contracting. July 4. 10 cents.

Earth:

Construction of Dirt Road. Transportation of earth, building embankments and standard plant. 1,500 words. Contracting. July. 20 cents.

Foundation:

Soil Texture and Stratification Affecting Road Foundations. By C. R. Thomas. 5 ills. 800 words. Engineering and Contracting. July 4. 10 cents.

Use of Sub-Base with Concrete Surfaces. Result of investigation conducted by Universal Portland Cement Co. 1,500 words. Engineering and Contracting. July 4. 10 cents.

General:

Meets Highway Contractors' Labor and Material Problem. Massachusetts State Highway Commission introduces cost-plus-unit-profit contracts to remove gambling element. 1,400 words. Engineering News-Record. July 26. 15 cents.

Advertising Paving in Chicago. Paving contractors in that city conduct campaign to promote confidence of tax payers in paving work and stimulate further paving work. 1,000 words. Municipal Journal. July 19. 10 cents.

How Are Vertical Loads Distributed to Earth Fills? Tests made by office of public roads give method of finding spread of concentrated load. 2 ills. 1,000 words. Engineering News-Record. July 19. 15 cents.

Road Survey Methods of the Kentucky Department of Public Works. Abstract of Bulletin No. 9, Ky. Department of Public Roads. 2,200 words. Good Roads. July 28. 10 cents.

Standards for Plans for Federal Aid Road Projects. 2,000 words. Engineering and Contracting. July 4. 10 cents.

Legal:

General Highway Traffic Law of New York. 3,500 words. Good Roads. July 14. 10 cents.

The New Highway Law of Illinois. 1,200 words. Good Roads. July 28. 10 cents.

Machines:

Modern Road Making Machinery: Its Selection, Use and Care. From paper by W. Huber. 2,700 words. Canadian Engineer. July 5. 15 cents.

Machine Work Hastens and Cheapens Street Grading. Hand and machine methods of making wide shallow cuts contrasted. Excavator crowns bottom of cut closely to cross section. Little time lost in traveling from job to job. 2 ills. 1,000 words. The Contractor. July 20. 10 cents.

Maintenance:

The Maintenance of Federal Aid Roads in Texas. From a paper by J. D. Fauntleroy. 2,000 words. Good Roads. July 28. 10 cents.

Methods and Cost of Road Maintenance, Repair and Reconstruction in New York State in 1916. 5 ills. 3,500 words. Good Roads. July 14. 10 cents.

Method and Cost of Concrete Road Maintenance in Milwaukee County. 800 words. Engineering and Contracting. July 4. 10 cents.

Military Roads:

Military Road Building in Pennsylvania. 6 ills. 1,000 words. Good Roads. July 21. 10 cents.

Military Roads in France. Methods of maintenance and construction. 1,000 words. Municipal Journal. July 12. 10 cents.

Pavements:

Street and Road Pavements. Design, construction and maintenance. Description of progress, including points on best practice in concrete road construction. 6 ills. 4,000 words. Municipal Engineering. July. 25 cents.

Sidewalks:

Sidewalk Problems—How They Are Solved. 4 sidewalk contractors contribute ideas. 1,000 words. Concrete. July. 20 cents.

Street Railway Tracks:

What Shall We Do With the Paving Burden? Summons authorities to prove injustice of making the railway maintain paving between car tracks. By R. C. Cram. 6 ills. 8,000 words. Electric Railway Journal. June 23. 10 cents.

Methods and Materials for Paving Between Street Railway Tracks in Philadelphia and Baltimore. 6 ills. 1,200 words. American City. July. 50 cents.

Power Tools Speed Up Track Work. Pneumatic asphalt cutting tools and tie tampers, steam shovel and self-propelled concrete mixer called out to help solve the labor problem. By F. H. Hill 12 ills. 3,000 words. Electric Railway Journal. June 30. 10 cents.

Wood Block:

The Details of Construction of Wood Block Pavements. By A. W. Dow. 3 ills. 8,000 words. Better Roads and Streets. July. 10 cents.

SEWERAGE, DRAINAGE AND SANITATION.

Activated Sludge:

50,000,000-Gal. Activated Sludge Plant Recommended for Stockyards District Chicago. 4,000 words. Engineering and Contracting. July 11. 10 cents.

Activated Sludge Plant at Worcester, England. Results of experimental work. 4 ills. 3,000 words. Canadian Engineer. July 12. 15 cents.

The Operation of the Activated Sludge Type of Sewage Plant. By G. B. Gascoigne, Sanitary Engineer of Cleveland. 8 pages. Journal of the Ohio Society of Engineers. $1.00.

Construction:

Sewer Construction by Open Cut and Tunnel Methods in Sanitary District of Chicago. 5 ills. 3,500 words. Engineering and Contracting. July 18 10 cents.

Constructing an Open Concrete Storm Water Outlet. Creek channel enlarged by drag line scraper and lined with concrete. 3 ills. 600 words. Contracting. July. 20 cents.

Change From Trench to Tunnel Reduces Cost of Small Sewers. Sewer built in tunnel from 92 shafts, portable head houses being shifted from shaft to shaft. 3 ills. 2,500 words. The Contractor. July 6. 10 cents.

Industrial Railways Link Plant Units on Sewer Work. Separate track systems serve trenching and concreting operations. Batches proportioned at material yard delivered by one railway direct to mixer. 6 ills. 1,100 words. The Contractor. July 20. 10 cents.

Succession of Short Tunnels Beneath Shafts Reduces Pipe Sewer Excavation 2 ills. 750 words. The Contractor July 6. 10 cents.

Drainage:

Drainage Methods for Irrigated Shal Land. 4,000 words. Engineering and Contracting. July 11. 10 cents.

Purification Plants:

Dallas Builds Imhoff Sewage Work Fed by Concrete Pressure Line. Little leakage through expansion joints Ground water at disposal plant is carried under tank bottoms. Steel from sections were used 12 times each. 4 ills. 2,000 words. Engineering News Record. July 5. 15 cents.

Unusual Location of Tanks Obviates Pumping at Sewage Filters. Clarification at head of outfall gives low self cleansing velocity and saves grade Horizontal-flow, primary filters of coke make a high rate of sand filtration possible. By G. Everett Hill. 2 ills. 2,500 words. Engineering News-Record July 12. 15 cents.

Sanitation:

Military Sanitation in the War Methods and appliances used by the English and the French. Disposing of refuse. Providing drinking water. 4 ills. 3,800 words. Municipal Journal July 26. 10 cents.

Sewers:

Deposits in Tidal-Water Sewers. Letter from Kenneth Allen. 2 ills. 1,000 words. Engineering News-Record July 19. 15 cents.

Stream Pollution:
Regulation of Stream Pollution in Texas. By V. M. Ehlers, State Sanitary Engineer. 1,500 words. American City. July. 50 cents.

Industrial Wastes Disposal. Discussion of river pollution and of methods of disposing of and recovering trade wastes. From a paper by Harrison P. Eddy. 5,000 words. Metallurgical and Chemical Engineering. July 1. 25 cents.

WATER SUPPLY.

Aeration:
Aeration of "Sulphur" Water in Florida. By Geo. W. Simons, Jr. 1 ill. 600 words. Engineering and Contracting. July 11. 10 cents.

Bacteria:
The Differentiation of Bacteria of the Colon-Aerogenes Family. From a paper by W. M. Clark. 1,250 words. Fire & Water Engineering. June 27. 10 cents.

Dam:
Earth Dam Compacted by Flooding. 4 ills. 1,000 words. Engineering and Contracting. July 18. 10 cents.

Design:
Design of the Railway Tank. Some of the interesting problems involved in the design of the modern railway tanks that are not found in any other structure. 1 ill. 1,200 words. Canadian Engineer. July 19. 15 cents.

Electrolysis:
Electrolysis in Underground Water Pipes. From a paper by J. W. Ivy. 3,000 words. Fire & Water Engineering. June 27. 10 cents.

Electrolysis in Underground Water Pipes. Stray currents. Local action. Mitigation of electrolysis. By J. W. Ivy. 3,000 words. Canadian Engineer. July 12. 15 cents.

General:
Oklahoma's Regulation of Water Supplies and Sewerage. New state law requires approval of water and sewerage plants by the State Board of Health. Preventing river pollution. 1,000 words. Municipal Journal. July 26. 10 cents.

Earthquake Breaks Los Angeles Aqueduct. By C. W. Geiger. 800 words. Municipal Journal. July 26. 10 cents.

Abstracts from Recent Water Works Reports. 1,250 words. Engineering and Contracting. July 11. 10 cents.

Rate Paying Engineers Criticize Montreal Aqueduct Report. 2,700 words. Canadian Engineer. July 12. 15 cents.

Funding Sanitary Improvements as a Means of Increasing Water Consumption. By R. A. Butler and F. C. Jordan. 2,500 words. Fire and Water Engineering. July 18. 10 cents.

Water Works Management in Akron. 800 words. Municipal Journal. July 19. 10 cents.

Reforesting Water Supply Land on Catskill System. Advantages of reforestation outlined. Available varieties of trees. Over 2,000,000 conifers planted around Ashokan and Kensico reservoirs. By F. F. Moore. 1 ill. 1,200 words. Engineering News-Record. July 12. 15 cents.

Making Surveys for Land and Lake Tunnel at Chicago. Methods employed. 2 ills. 2,500 words. Engineering News-Record. July 26. 15 cents.

Shipping Water Samples. Description of a 4-bottle case furnished to cities by the state board of health of West Virginia for shipping water samples. 1 ill. 1,000 words. Municipal Journal. July 12. 10 cents.

Pipe Lines:
Method of Laying 14,000-ft. Submerged Universal Pipe Line. 2 ills. 1,100 words. Engineering and Contracting. July 11. 10 cents.

Creosoted Woodstave Pipe Line for Irrigation Project. 3 ills. 1,000 words. Engineering and Contracting. June 11. 10 cents.

Deterioration of Carrying Capacity of Cast Iron Pipe. 1,750 words. Engineering and Contracting. July 11. 10 cents.

Cement Joints for Cast Iron Water Mains. Discussion by members of the A. S. C. E. 1 ill. 5,000 words. Canadian Engineer. July 19. 15 cents.

Experience with a Vitrified Water Conduit. Making water tight joints in a line of 18-inch vitrified pipe. Bituminous compounds were used. Difficulties due to use of cement. Method of making test and repairing leaking joints. 6 ills. 2,200 words. Municipal Journal. July 5. 10 cents.

Cast Iron Pipe Specifications. Discussion between the members of the American Water Works Assn. Committee, manufacturers and users. 5,000 words. Engineering News-Record. July 19. 15 cents.

Wrought Iron and Steel Pipe Sizes. Between ordinary pipes of the various weights there is a wide difference in actual internal diameters for the same nominal diameter. By A. J. Dickson. 1,500 words. Power. July 17. 5 cents.

Pumping:
Another Jump in Duty Record of Turbine Centrifugal Pumps. New Toronto unit is very efficient. 1,200 words. Engineering News-Record. July 26. 15 cents.

Saving Coal in the Waterworks Pumping Station. Losses in the boiler plant and how to prevent them. Utilizing heat in exhaust steam. Firing; air leaks; clean tube; high pressure; engine performance; slippage. By M. F. Stein. 1 ill. 2,500 words. Municipal Journal. July 19. 10 cents.

Distribution of Pumpage in Force Mains and Laterals. Chart illustrating flow-distribution survey made by pitometers at St. Louis water works. By F. L. Bock. 1 ill. 1,000 words. Engineering News-Record. July 12. 15 cents.

Electric Pumping in Michigan. 1 ill. 1,200 words. Municipal Engineering. July. 25 cents.

Purification:
Do Water Filters Make Water Shed Ownership Unnecessary? Water rate case in California involves a valuation of $4,000,000. 1,000 words. Engineering News-Record. July 5. 15 cents.

Electrolytic Cell Chlorine for Water Sterilizer. Description of method and apparatus employed for treating the public supply of Montreal, Canada. Cost compared with hypochlorite. 1,200 words. Municipal Journal. July 12. 10 cents.

Some Water Purification Experiences Difficulties with pipes for alum solution. Chemical solution agitators. Protecting concrete. Breaking of Tobin bronze strainer plates. From a paper by L. I. Birdsall. 1,600 words. Municipal Journal. July 19. 10 cents.

The New Brunswick Filtration Plant. Rapid sand, with capacity of six million gallons a day. Water passes over a large aerator before treatment. Wheeler type of strainer bottom used. 2 ills. 1,900 words. Municipal Journal. July 26. 10 cents.

Reservoirs:
California Reservoirs Silt Up Slowly. By Edward Bowen. 1 ill. 1,500 words. Engineering News-Record. July 26. 15 cents.

Sealing a 200-Acre Reservoir. To stop serious leak from Cedar river reservoir bottom clay and gravel are being sluiced in above dam. By J. D. Ross. 800 words. Engineering News-Record. July 26. 15 cents.

Building a 2,000,000-gal. Reinforced Concrete Tank. Constructed for Tuscaloosa, Ala. 4 ills. 2,000 words. Canadian Engineer. July 5. 15 cents.

Bottle Tight Basin with Circular Baffles Withstands Ice. Simple construction at Bedford, Ind., proves economical. New dry-line feeder is developed. 2 ills. 1,500 words. Engineering News-Record. July 5. 15 cents.

Supplies:
Sault Ste. Marie Water Supply Project. Present source is badly polluted and filters must be installed or new supply obtained. 5 schemes are suggested. Gravity supply favored. By R. O. Wynne-Roberts. 6 ills. 5,000 words. Canadian Engineer. July 12. 15 cents.

Water Supply in the Killarney Rural District. 2,000 words. The Surveyor. June 8. 40 cents.

Sources of Water Supply in the United States. 700 words. Municipal Journal. July 19. 10 cents.

The Toledo Water System. Ample supply of good quality. 1,200 words. Fire & Water Engineering. July 18. 10 cents.

Water Supply Standards and Their Improvement. By W. J. Orchard. 1,500 words. Fire & Water Engineering. July 18. 10 cents.

Recent Progress and Tendencies in Municipal Water Supply in the United States. By J. W. Alvord. 1,200 words. Fire & Water Engineering. July 25. 10 cents.

Thawing Pipes:
Thawing Water Pipe Trench. Experience in Pocatello, Idaho. 800 words. Municipal Engineering. July. 25 cents.

Waterworks:
Water Works Statistics. Supplementary to those published in the May 3rd issue. 3 pages. Municipal Journal. July 5. 10 cents.

Water Works Statistics. Special report to Fire & Water Engineering. 2 pages. Fire & Water Engineering. July 4. 10 cents.

Valuations:
Costs of Preparing Valuations for Small Water Companies. By A. F. Brewer, Jr. 1 ill. 2,500 words. Engineering and Contracting. July 11. 10 cents.

LIGHTING AND POWER.

Shading Street Lamps. Substitute for black paint inside the globe. 1 ill. 500 words. Electrical World. June 23. 10 cents.

The Lighting of Parks and Playgrounds. By H. A. Tinson and A. L. Powell. 4 ills. 3,000 words. The American City. July. 50 cents.

Concrete Lighting Standards. How the molds are made, the posts cast, cured and handled. 3 ills. 1,100 words. Concrete. July. 20 cents.

New Power Station at Albany. A modern small central station, substantially built to give service and make money. By C. H. Bromley. 12 ills. 5,000 words. Power. July 17. 5 cents.

Economical Combination of Water-Power and Steam Plants. A determination of the respective economic limits in steam and water power development. The economic limit depends largely on the value of money, fuel, labor and the increased efficiency of steam turbines and the location of the enterprise. By H. St. Clair Putnam. 1 ill. 2,000 words. Power. July 24. 5 cents.

Formulas for Determining Accurately Heat Carried Off by Flue Gases. 3,000 words. American Gas Engineering Journal. July 21. 10 cents.

Working Toward Saturation in 32 Towns. Interesting development in Iowa. Method of soliciting current sales. By Arthur Huntington. 2,000 words. Electrical World. June 23. 10 cents.

The Future of Electricity Supply. From an address by F. M. Long. 2,000 words. The Surveyor. June 22. 40 cents.

How To Intepret Diesel Indicator Cards. By E. R. Neale. 22 ills. 1,500 words. The Power Plant. July. 15 cents.

FIRE.

Inspection of Buildings. Rules adopted for the guidance of firemen in fire prevention work. 700 words. Fireman's Herald. July 14. 5 cents.

Fire Prevention in Canton. Weekly school for firemen; ordinances regulating rubbish and storing of gasoline. 1,000 words. Fire & Water Engineering. July 4. 10 cents.

Protecting the Factory From Fire. Inspecting forms and bulletins. By Wm. Guerin. 1,000 words. Fire & Water Engineering. June 27. 10 cents.

Fire Prevention and Taxation. From a paper by T. F. Baker. 2,000 words. Fire and Water Engineering. June 27. 10 cents.

Fire Department Practice. Rules formulated by Chief Clancy and Asst. Chiefs of Milwaukee. 1st instalment. 1,000 words. Firemen's Herald. July 7. 5 cents.

Practical Hydraulics for Fireman. By Fred Shepard. 6 ills. 1,250 words. Fire & Water Engineering. July 4. 10 cents. July 18. 10 cents. July 25. 10 cents.

An Attractive Fire Station. 2 ills. 500 words. Firemen's Herald. July 14. 5 cents.

Arson and Law. Crime regarded by prosecutors as most difficult in which to secure conviction. How firemen can help. From an address by H. A. Thornton. 1,500 words. Firemen's Herald. July 7. 5 cents.

The Benefit of Standard Hose Couplings and Cooperation Between Fire Departments. 1,500 words. Fire & Water Engineering. July 25. 10 cents.

Fire Alarm Telegraph Systems, Their Installation and Care. From a paper by F. A. Cambridge. 1,500 words. Fire & Water Engineering. July 25. 10 cents.

STREET CLEANING AND REFUSE DISPOSAL.

Refuse:
Specifications for Domestic Garbage Incinerators. A critical analysis of requirements. By C. C. Myers. 2 ills. 2,500 words. Gas Age. June 15. 20 cents.

Toronto's New Refuse Collection Wagons. Type of wagon developed. 1 ill. 1,000 words. Municipal Journal. July 19. 10 cents.

Electric Refuse Collection Truck. Operating results and cost in Dover, England. 500 words. Municipal Journal. July 5. 10 cents.

House Refuse: Its Calorific Value and Its Possibilities. By Reginald Brown. 3,250 words. The Surveyor. June 22. 40 cents.

Utilizing Waste Cans. Practice in England. 450 words. Municipal Journal. July 5. 10 cents.

Snow Removal:

Snow Fighting vs. Snow Removal at New York City. 2 ills. Engineering and Contracting. July 4. 10 cents.

Street Cleaning:

How Philadelphia Conducted an Educational "Clean Streets" Campaign. 2 ills. 2,500 words. Engineering and Contracting. July 4. 10 cents.

Work of Street Cleaning Department of New York City. Extracts from report of Street Cleaning Commissioner. 3 ills. 2,000 words. Engineering and Contracting. July 4. 10 cts.

Efficiency Methods in Street Cleaning. How New York City lowered costs while extending service and increasing wages. 4 ills. 3,000 words. Municipal Engineering. July. 25 cents.

Flushing: Its Place in the Street Cleaning Field. Basis for comparing results. Elements affecting costs. Standards of quality needed. Defective pavements increase cost of cleaning. By R. W. Parlin. 7 ills. 1,700 words. Canadian Engineer. July 19. 15 cents.

MOTOR VEHICLES.

Motor Trucks Deliver Concrete for Track Elevation Work. 2 ills. 1,000 words. Engineering & Contracting. July 25. 10 cents.

Timely Economy of Industrial Electric Truck. Extraordinary developments in last two years of electrically driven trucks. Battery charging a valuable off-peak load. 13 ills. 3,000 words. Electrical World. June 23. 10 cents.

Use of Automobiles for Survey Work for Irrigation Project. Advantages in using them for transportation purposes. 1,750 words. Engineering and Contracting. July 11. 10 cents.

Cost Data on Operation on Small Maintenance Trucks. 2 ills. 700 words. Engineering and Contracting. July 4. 10 cents.

Comparative Data on Cost of Operating Gas and Electric Cars. Tests made under various conditions show electric passenger car more economical in every case. 800 words. Electrical Review. June 30. 10 cents.

CITY PLANNING.

Underground Survey in Philadelphia. 250 words. Municipal Journal. July 5. 10 cents.

Improved Major-Street Plan for St. Louis Proposed by City Plan Commission. Lack of planning has resulted in disjointed narrow main-traffic streets with weak radical system. Widening and minor extensions proposed. Argument reinforced by striking maps. By Howard Bartholomew. 8 ills. 3,500 words. Engineering News-Record. July 19. 15 cents.

BRIDGES AND RETAINING WALLS.

Diagrams Facilitate Design of Concrete Retaining Walls. 2 standard types of wall considered, one without surcharge and the other with surcharge of Cooper's E-55 live loading. 2 ills. 1,000 words. Engineering News-Record. July 5. 15 cents.

Locomotive Cranes Erect Cantilever Over Ohio River. Suspended span practically completed. Structure is 1,120 ft. long. 4 ills. 1,100 words. Engineering News-Record. July 19. 15 cents.

Standard Bridge Floor of Concrete Slabs and Steel Beams. Weights, bending moments and costs computed for usual specifications. Live load a 15-ton road roller. By Wm. Smith. 4 ills. 2,000 words. Engineering News-Record. July 12. 15 cents.

The Economy of Good Highway Bridges. By Chas. D. Snead. 1 ill. 1,000 words. Southern Good Roads. July. 10 cents.

Bids for Concrete Arch Viaduct Less Than for Steel Design. James River bridge at Richmond, Va., illustrates advantages of concrete over steel railroad bridges. By H. G. Perring. 2 ills. 1,000 words. Engineering News-Record. July 12. 15 cents.

Cement Gun Construction Method. Review of application of gunite to wall construction and similar work. By Bryan C. Collier. 1 ill. 2,500 words. Canadian Engineer. July 12. 15 cents.

Standards of the Kentucky Department of Public Roads for Concrete and Steel Highway Bridges. By Rodman Wiley and C. D. Snead. 7 ills. 1,500 words. Good Roads. July 21. 10 cents.

Bascule Bridge Is Erected as a Cantilever. Bridge at Chattanooga erected by unusual methods. By W. J. Howard. 6 ills. 1,000 words. Engineering News-Record. July 26. 15 cents.

Bascule Bridge Across Cataraqui River. Details of construction and method of operation of 160-ft. span bascule bridge at Kingston, Ont. By R. K. Palmer. 8 ills. 2,500 words. Canadian Engineer. July 5. 15 cents.

Saving a Railway Bridge Built 63 Years Ago. Half-inch coating of gunite applied to brick work of abutment and eight piers of railway bridge at Weston, Ont. Three thousand sq. yds. shot in six weeks at a cost of 47c a yard. 3 ills. 1,500 words. Canadian Engineer, July 26. 15 cents.

Design of Steel Spans, 40 Feet and Up. By Chas. D. Snead. 3 ills. 2,500 words. Better Roads and Streets. July. 15 cents.

Bridge Maintenance in Philadelphia. 500 words. Municipal Journal. July 12. 10 cents.

Efficiency of Basic Pigments as Metal Primers. 1,500 words. Engineering & Contracting. July 25. 10 cents.

Service Tests on Bridge Paint. Study made by Iowa Highway Commission. 500 words. Municipal Journal. July 19. 10 cents.

MISCELLANEOUS.

Building the Army Cantonments. How the sites were selected; laying out the building location; purchasing and transporting the materials and supervising the work. Precautions against fire; building plans; water supply and sewerage. 4 ills. 5,000 words. Municipal Journal. July 12. 10 cts.

Building the Army Cantonments. Continued from July 12th issue. Some details of the individual cantonments. Engineering work at Camp Ayer. Topographical surveying, water supply and sewerage. 1 ill. 2,800 words. Municipal Journal. July 19. 10 cents.

Plans for Army's Big Training Camps Made Public. A system perfected for handling and checking rush deliveries of vast quantities of materials. Labor pay to be limited. 6 ills. 1,800 words. Engineering News-Record. July 5. 15 cents.

Construction and Structural Features of Cantonments for New National Army. Construction is now under way on all of the 16 cantonments. 3 ills. 3,500 words. Engineering and Contracting. July 25. 10 cents.

Interlocking Blocks Tied Together Concrete Chimney. By W. S. Winters. 3 ills. 1,500 words. Engineering News-Record. July 12. 15 cents.

Tapering Concrete Chimney Has Double Shell. Arrangement improves draft and efficiency and reduces liability of cracks. Is 180 ft. high. 2 ills. 800 words. Engineering News-Record. July 26. 15 cents.

Open Air Swimming Pools in Wisconsin Cities. 3 ills. 1,500 words. American City. July. 50 cents.

Trench and Tunnel Excavation. Various methods in use. 5 ills. 3,000 words. By J. F. Springer. Municipal Engineering. July. 25 cents.

Making Industrial Valuation for Tax Purposes. Appraisal of machinery and equipment quickly made. By G. E. Barrows. 1 ill. 2,000 words. Engineering News-Record. July 26. 15 cents.

Individual Interests in Municipal Enterprises. By J Horace Bowden. 3,500 words. The Surveyor. June 22. 40 cents.

Materials and Tests. Abstracts of papers before the American Society of Testing Materials. 1,800 words. Engineering News-Record. July 12. 15 cents.

Three-Batch Measuring Cars Supply Mixer for Gondolas. 1 ill. 500 words. By J. C. Foss. Enginering News-Record. July 5. 15 cents.

Materials and Methods of Tests Discussed at Meeting of American Society for Testing Materials. Abstracts of some of the papers. Subjects presented. 3,600 words. Engineering News-Record. July 5. 15 cents.

From Mixer to Forms at a Mile a Minute. Pneumatic method used to deliver concrete 4,000 feet in Twin Peaks Tunnel at San Francisco. 1 ill. 1,250 words. Engineering News-Record. July 12. 15 cents.

Problems in National Price Fixing. Interferences in purchasing may lead to government purchasing agency. 1,000 words. Engineering News-Record. July 19. 15 cents.

Starting a Fifteen Hundred Acre Land Clearing Contract in Jig Time. Work began two days after signing contract. 30 acres cleared and grubbed the first week. 2 ills. 1,200 words. The Contractor. July 20. 10 cents.

Base Plant Charges on Plant Rental Price. By Daniel J. Hauer. 1,000 words. The Contractor. July 6. 10 cents.

Averaging Thirty-six Hundred Yards a Day by Drag Line. Digging from above solves water troubles in sand cut. Side sloped by machine need only minor trimming. 4 ills. 1,000 words. The Contractor. July 20. 10 cents.

Pneumatic Concrete Mixing and Conveying in New York Subways. Second of two articles. Concreting segmental iron lining of tunnel tube. 5 ills. 1,000 words. Contracting. July. 20 cents.

Placing Concrete Ninety-nine Per Cent Mechanically. From the river bed to the arch ring gravel aggregate is untouched by hand. 1 set of form units serves for 6 piers. 6 ills. 1,000 words. The Contractor. July 20. 10 cents.

Conduit Installation Made in Toronto in Record Time. 24-duct line, 13,400 feet long, laid through downtown section within 2 months. 10 ills. 1,500 words. Electrical Review. June 30. 10 cents.

Tests of Concrete Slabs to Determine the Effect of Removing Excess Water Used in Mixing. From a paper by A. M. Johnson. 1 ill. 1,500 words. Good Roads. July 21. 10 cents.

Logic for Engineers, Induction and Deduction. The seventh in a series of articles. By Halbert P. Gillette. 3,500 words. Engineering and Contracting. July 4. 10 cents.

Surety Bonds Under Government Contracts. A review of the most important cases. From a paper by Wm. B. King. 5,000 words. Engineering and Contracting. July 18. 10 cents.

Methods of Locating Curves on Subdivisions. Location of regular curves by deflection angles. Graphic methods of laying out curves and random location of lot corners. By R. R. Grant. 2600 words. Canadian Engineer. July 26. 15 cents.

Reinforced Concrete Ships. By J. L. Weller. 2 ills. 1500 words. Canadian Engineer. July 26. 15 cents.

Distribution of Pressures Through Earth Fills. From a paper by A. T. Goldbeck. 5 ills. 2,000 words. Canadian Engineer. July 26. 15 cents.

Cleveland Subway Cuts Sheeted with Round Piles. Run motor trucks through excavation and load them by steam shovel on east end; use cranes and portable hoppers on west approaches. 5 ills. 1,700 words. Engineering News-Record. July 26. 15 cents.

PERSONALS

Aull, John W., has been appointed a member of the Ohio State Highway Advisory Board by Governor Cox. Other members include D. H. Kirwan, D. H. Humphrey and A. R. McCulloch.

Coulter, William, district chief of the Boston, Mass., fire department has retired after a service of 35 years.

Ferguson, J. C., mayor of Creston, Ia., has resigned the office in order to become a lieutenant in the Iowa forces.

Walker, Boyd, ditch engineer for Pottawattamie county, Ia., has been appointed acting county engineer to serve during the absence of Marshall Howard, county engineer, who is serving as captain of a company of engineers.

Whalen, Dr. W. E., city physician of Ogden, Utah, has resigned to enter army service.

(*Continued on page* 145)

NEWS OF THE SOCIETIES

Calendar of Meetings.

Aug. 15-17.—LEAGUE OF WISCONSIN UNICIPALITIES. Annual convention, acine, Wis. Secretary, Ford H. Macregor, Madison, Wis.

Aug. 21-23.—NEW YORK STATE IREMEN'S CONVENTION, Flushing, N. Secretary, Thos. Honohan, Frankfort, Y.

Aug. 22.—UNION OF NEW BRUNSVICK MUNICIPALITIES. Annual conention, St. John, N. B. Secretary, James ng Kelley, St. John.

Aug. 27-29.—UNION OF CANADIAN UNICIPALITIES. Annual convention, ondon, Ont. Secretary, W. D. Lighthall, .C., Westmount, Que.

Aug. 29-31.—UNION OF NOVA SCOTIA UNICIPALITIES. Annual convention, ruro, N. S. Secretary, Arthur Roberts, ridgewater, N. S.

Aug. 29-31.—ONTARIO MUNICIPAL SSOCIATION. Annual convention, Toronto, Ont. Secretary, B. H. Spence, 705 umsden building, Toronto, Ont.

Sept. 10-15.—NATIONAL EXPOSITION F SAFETY AND SANITATION. Annual onference, New York, N. Y. Secretary, W. C. Cameron, Continental and Comercial Bank building, Chicago, Ill.

Sept. 11-13.—AMERICAN ASSOCIAION OF PARK SUPERINTENDENTS. nnual convention, St. Louis, Mo. Secetary, Roland W. Cotterill, 533 City all, Seattle, Wash.

Sept. 11-14.—INTERNATIONAL ASSOIATION OF MUNICIPAL ELECTRICANS. Annual convention, Niagara Falls, . Y. Secretary, Clarence R. George, ouston, Tex.

Sept. 11-14.—NEW ENGLAND WATERVORKS ASSOCIATION. Annual conention, Hartford, Conn. Secretary, Wilard Kent, 715 Tremont Temple, Boston, lass.

Sept. 18-20.—LEAGUE OF IOWA MUICIPALITIES. Annual convention, Iowa ity. Secretary, Frank G. Pierce, Marhalltown, Ia.

Sept. 18-20.—LEAGUE OF VIRGINIA UNICIPALITIES. Annual convention, ynchburg, Va. Secretary, L. C. Brinon, Portsmouth, Va.

Sept. 24-29.—LEAGUE OF CALIFORIA MUNICIPALITIES. Annual convenion, Santa Rosa, Cal. Secretary, Wm. J. ocke, Pacific Building, San Francisco, al.

Sept. 25-27.—SMOKE PREVENTION SSOCIATION. Annual convention, Colmbus, O. Secretary, Frank A. Chamers, City Hall, Chicago, Ill.

Sept. 27-29.—AMERICAN AND CANADIAN ENGINBERS AND ARCHITECTS F NORWEGIAN BIRTH OR DESCENT. nformal congress and re-union, Chiago Norske Klub, Chicago, Ill. Chairnan, Committee on Arrangements, Joachim G. Glaver, consulting engineer, hicago, Ill.

Oct. 9-12.—LEAGUE OF KANSAS MUNICIPALITIES. Annual convention, Wichita, Kan. Secretary, C. H. Talbot, niversity of Kansas, Lawrence, Kan.

Oct. 15-17.—NATIONAL HOUSING ASSOCIATION. Annual conference, Hotel a Salle, Chicago, Ill. Secretary, Lawence Veiller, 105 East 22d St., New York ity.

Oct. 17-18.—LEAGUE OF MINNESOTA UNICIPALITIES. Fifth annual conention, St. Cloud, Minn. Secretary-reasurer, Richard R. Price, University f Minnesota, Minneapolis.

Oct. 22-24.—AMERICAN CIVIC ASSOCIATION. Annual meeting, St. Louis, Mo. Secretary, Richard B. Watrous, 914 Union Trust building, Washington, D. C.

Nov. 19-24.—CITY MANAGERS' ASSOCIATION. Annual meeting, Detroit, Mich. Secretary, W. L. Miller, City Manager, St. Augustine, Fla.

Nov. 20-23.—PLAYGROUND AND RECREATION ASSOCIATION OF AMERICA. Recreation Congress, Milwaukee, Wis. Secretary, H. S. Braucher, 1 Madison Ave., New York, N. Y.

Nov. 21-24.—NATIONAL MUNICIPAL LEAGUE. Twenty-third annual meeting, Hotel Statler, Detroit, Mich. Secretary, Clinton Rogers Woodruff, 703 North American Bldg., Philadelphia, Pa.

League of American Municipalities.

The postponement of the annual convention of the League of American Municipalities, which has been announced for Sept. 5 to 8, has been requested by the president and secretary of the association.

League of Michigan Municipalities.

Federal control of all coal mines and shipments if necessary was urged by the League of Michigan Municipalities in session at Grand Rapids July 26 and 27. A resolution asking the government to take over the coal mines was passed and the president was instructed to wire the president.

Another resolution adopted asked an amendment to the state constitution to permit cities to operate fuel yards and sell coal. It was alleged in the discussion that retail coal dealers are not treating the public fairly.

Flint was selected as the convention headquarters for the 1918 meeting of the league. The following officers were elected: President, E. F. Johnson, Flint, former vice president; vice president, Mayor J. G. Reutter, Lansing; secretary-treasurer, Charles A. Sink, Ann Arbor.

Directors, R. V. Mundy, Bay City; Ira H. McKinnie, Alma; Philo C. Fuller, Grand Rapids; James W. Marsh, Battle Creek, and B. H. McMullen, Cadillac.

League of Third Class Pennsylvania Cities.

The annual convention of the third class city league will be held in Harrisburg August 28, 29 and 30.

Illuminating Engineering Society.

As announced in a previous issue, in place of the regular annual convention of the Illuminating Engineering Society this year it is planned to hold a correspondence convention. The Committee on Papers reports the following papers scheduled for inclusion in this convention:

Presidential address, by W. J. Serrill; report of Committee on Progress, by F. E. Cady, chairman; report of Committee on Nomenclature and Standards, by A. E. Kennelly, chairman; paper on "The Hemisphere as an Integrating Photometer for Projectors, Etc.," by F. A. Benford; a "Color Symposium," conducted as follows: Introductory, by M. Luckiesh; Physics, by H. C. Richards; Psychology, by L. T. Trowland; Specifications and Tests, by I. G. Priest; Color in Illumination, by Beatrice Irwin; a paper on "Importance and Value of Illuminating Engineering to Central Stations," by Thos. F. Kelly; "Application of Illuminating Engineering to the Gas Industry," by E. F. Pierce; "Growth and Present Status of Systems Used in the Maintenance of Gas Lamps in Residences," by E. B. Myers; "Lighting of Independence Square, Philadelphia," by E. F. Kingsbury; "Lighting of Textile Mills," by G. Wrigley; "Economics in the Operation of Large Lighting Installation," by C. L. Law and J. L. Buckley; "Illumination Intensities in Some of the Large Department Stores in New York City," by W. F. Little and J. F. Dick; "Illuminating and Engineering Advertising," by G. H. Stickney.

It is planned in a few weeks to arrange these papers in groups for release, respectively during September, October and November, and possibly December. Early in the month of release, copies will be sent to any one who may apply for them to the general office, and will be accompanied by invitation to submit a written discussion. The boards of managers of sections may, if they wish, utilize such papers for section meetings.

PERSONALS

(Continued from page 144.)

Blinn, Ray S., has resigned his position as city manager of Westerville, O., to go into the contracting business. Mr. Blinn was formerly director of public service and city engineer in charge of paving at Columbus, O.

Shenehon, Francis C., Mem. A. S. C. E., and for the past eight years head of the College of Engineering, University of Minnesota, is now giving exclusive attention to his practice as a consulting engineer, with offices at 628 New Metropolitan Bank building, Minneapolis, Minn. His special fields include water power, water supply, sewerage and sewage disposal, ship canals and river improvements, docks and terminals, flood control and drainage. He will also act as counsel in engineering litigation and settlements of engineering controversies and will prepare financial reports.

Dixon, G. Gale, chief engineering expert of the Akron water works, has been commissioned a captain in the engineers' corps at Fort Benjamin Harrison by the war department. Edward Nagle, also of the water works engineering staff, was commissioned as first lieutenant.

Johnson, Wilner E., 37 years old, for more than fifteen years engineer of car construction of the New York Municipal Railway company, died July 27 at his home, 1120 Elmore Place, Flatbush. He was the designer of the low-step "hobble car" now used by the Brooklyn Rapid Transit company. Mr. Johnson made a study of space allotment on transit lines, especially regarding seating capacity, and the result of this study was the production of the scientifically arranged seating capacity used in the Fourth avenue subway. He was a member of the American Electrical Railway Association and the American Society of Mechanical Engineers.

NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

TUNNEL PLATES.

"Hydraulic" Pressed Steel for Lining Tunnel Excavations.

"Hydraulic" pressed steel liner plates are used for the purpose of lining soft soil excavations for such construction as sewers, transit subways, utilities tunnels, waterworks tunnels, etc. They are left in place and the brick or concrete lining is built inside of them. They do not, nor are they intended to, afford a permanent shell protection, since the steel rusts much more quickly than cast iron. They are designed to protect the concrete or brick from any load until long after the time necessary for the material to become sufficiently hard to attain its required strength.

The excavation is made as closely as possible to the outside diameter of the steel plates so as to produce an even pressure all around the ring. If this is done the ⅛-inch-thick plate can then support a very large load and can be used safely at almost any depth. Economy of construction is the main feature of advantage claimed for this method and four principal reasons are advanced for this:

1. Because of the light weight, the erection can be accomplished by hand quickly and easily. A plate 12x⅛x30 inches weighs only about 18 pounds.

2. Each plate is an exact duplicate of every other plate, both as to size and perforations, so that no reaming, fitting or drifting is necessary as in built up plates.

3. By following up behind the excavation with the "Hydraulic" plates, it is claimed that the costly shield can be omitted. This obviates the use of piping, pumps and shield and the delay occasioned in operating the shield.

4. The operation of tunneling with the use of "Hydraulic" plate can be continuous. From two or three times as many lineal feet, it is claimed, can be excavated and lined per day as when the shield or cast iron lining is used, and with the same amount of labor.

The standard plate is 12 inches wide, ⅛ inch thick, and has a 2-inch flange. Any thickness up to 7/16 inch can be had to order.

The accompanying illustrations show the use of the tunnel plates on the big Passaic Valley (N. J.) sewer project and the method of installing them. They are made by the Hydraulic Pressed Steel Company, Cleveland, O. This company also makes a complete line of steel forms for concrete construction of all types. These are of open hearth steel and of standard shapes carefully and accurately pressed.

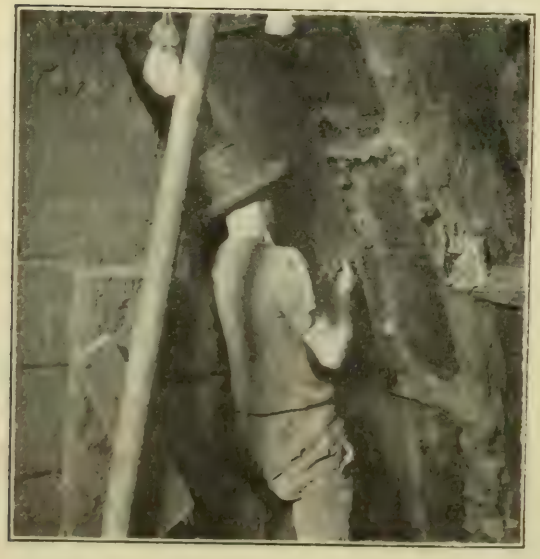
LENOX "AMERICAN" TRACTOR.

Four Wheel Drive and Four Wheel Steer.

The Lenox "American" tractor which is particularly adapted to all kinds of road work, is made in two sizes: 20 drawbar horse power and 60 drawbar horsepower. The power is transmitted direct from the driving axles to the face of the four lightweight drive wheels by pull rods, so that none of the driving strain comes on the spokes. The axles are steered, not the wheels. This makes operating easy, allows short turn and helps in steering in and out of ditches and furrows. It can therefore be successfully used on very bad roads in breaking up the drifts in winter, or in rolling out the muddy roads in spring. Side drifts are easily overcome and the tractor can go over piles of rocks, logs and holes. The patented drive wheels, light but ver strong, make it possible to work in di ficult sand, ice or snow. The whee do not clog up between the cleats. A other feature of advantage in roa work is that in cold or stormy weath the driver is completely protected an because of the location of motor, e haust and seat there is no uncomfor able overheating.

The motor is four-cylinder, 4-cycl 4¾ by 5½, extra heavy crank shaf large valves, in the smaller tractor an six-cylinder, 4-cycle, 5¾ by 7 in th larger. The same type motor is use in both sizes. Both motors are c pable of delivering full rated horse power continuously. A semi-heav duty moderate speed, vertical type head engine is used. There are tw ignition systems on a double switch A dry battery and vibrating coil wit distributor, set stationary, for startin motor, which prevents the possibilit of back-firing and independent hig tension magneto for working. Ther is no spark lever. All that is require for operating is throwing switc keeping connections secured fast an spark plugs clean.

Cooling is by forced circulatio through large outlets, with extra larg six-blade fan. No belts are used. Th fan is driven direct from crank sha by gear. The fan gear is provide with a clutch in light tension to r lieve all shocks from fan and gea The radiator is of special design, and always sufficient to keep the mot cool, water being replenished not mo than once a week. Lubrication by force circulating pump to all bea ings and cylinders. All tractor bea ings contain sufficient grease for season's work. The large flywheel r lieves shocks in starting heavy load



Bolting Plates Together.

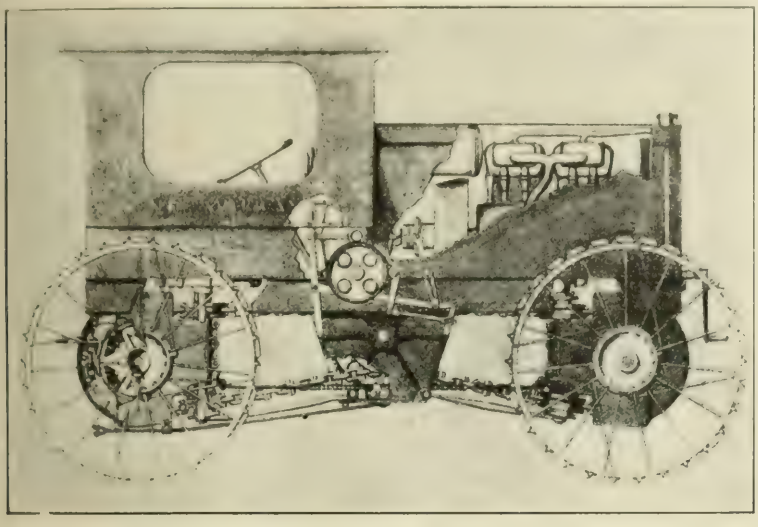
"HYDRAULIC" PRESSED STEEL TUNNEL PLATES.

Used on Passaic Valley Sewer.

The clutch, specially designed, is also large. It applies smoothly, but will not slip when engaged. There are no springs or catches of any kind. It operates with worm and sleeve. The transmission is three speeds forward and one reverse, selective type. It is a complete unit, with gear shift, clutch coupling, and final drive all built in transmission. The gears are large and of highest quality gear steel, properly heat treated and hardened. Each shaft has three bearings of white metal, and all bearings are self-lubricating. In the 20 horsepower model, final drive is through patented adjustable chain made of vanadium steel, extra strong. It performs like a belt, but it does not slip or run off, and eliminates universal

of the cab, placed conveniently close to the control levers so that all can be easily reached by the operator.

Two levers control all the operating of this tractor. One is used solely to shift gears. With the other, first the clutch is released, then the throttle closes, and, last of all, the brake is applied. On the reverse motion of this second lever, the brake is released, motor speeded up and the clutch engaged. When the tractor is started by engaging clutch, the motor is so connected that the speed is increased to the point desired. The advantage gained is that the motor anticipates the load and is speeded up to take the load. The device is designed to prevent the racing of the motor, either



LENOX "AMERICAN" TRACTOR (CUTAWAY VIEW).

joints, drive shafts and bevel drive gears. The wearing surface is many times larger than in ordinary drive chains. Each link is readily adjustable, without taking off anything or without any preparation whatever. The brake is a contracting band on large drum, and is operated by same lever that operates clutch, but they do not interfere with each other in operation.

The wheels in the 20 h. p. model are 40 inches high with 18-inch face.

The steering gear is of the worm and worm wheel type, completely enclosed in housing. Connection to the axles is made through block chain and turnbuckles. The gear is operated by a large hand wheel in the middle

before or after applying load. There is a governor built into the motor which will not interfere in any way with the operation of this controlling device.

The speed of the 20 h. p. machine is from ⅛ to 7 miles per hour; on low speed, 1⅝ miles; second speed, 2½ miles and high speed, 6 miles. The 60 h. p. tractor can make up to 6 miles per hour—five miles on high. The smaller tractor develops nominally 3,000 pounds drawbar pull and the larger one 8,000 pounds.

The accompanying illustrations show a cut-away view of the tractor (note the few working parts and direct transmission from motor to axles) and the machine at work hauling. The tractors are made by the Lenox Motor Car Co., Hyde Park, Boston, Mass.

INDUSTRIAL NEWS

Cast Iron Pipe.—Prices continue at the record high levels of the last few weeks. While private buying continues to some extent, only a few cities are making the best of the situation and buying for urgent needs. Quotations: Chicago—4-inch, class B and heavier, $68.50; 6-inch, $65.50. New York—4-inch, class B and heavier, $68.50; 6-inch, $65.50. Birmingham—4-inch, class B and heavier, $63; 6-inch, $60; class A, $1 extra.

The Goodyear Tire & Rubber Co., Akron, O., announces the following changes in its organization: W. A. Hazlett, formerly manager of the Detroit branch, has been appointed manager of the Detroit district. P. E. Ammon, who has been special dealers' representative of the Detroit district, becomes assistant to Mr. Hazlett. H. G. Norris, formerly manager at Toledo, has been promoted to the management of the Detroit branch. G. H. Hilbish has assumed charge of the Toledo branch, and is succeeded at Saginaw by Mr. W. D. McFarland, formerly a salesman in that territory. F. W. Telford, who has been Goodyear manager at Des Moines, has been assigned to the manufacturers' division at Detroit. R. E. Greene, former assistant manager at Minneapolis, succeeds Mr Telford at Des Moines.

Testing Cement for United States.—According to an announcement by director A. P. Davis of the U. S. Reclamation Service and director S. W. Stratton of the Bureau of Standards, the work conducted in the laboratories of the Reclamation Service at Denver, Colo., and San Francisco, Cal., is to be taken over by the Bureau of Standards. The personnel and equipment of these laboratories are to be transferred to the Bureau of Standards and maintained substantially as at present. Orders for cement shipments and inspection will be sent by the office of the chief of construction to the Denver office of the Bureau of Standards with copies to other offices, if desired. Government bills of lading will be furnished by the office of the

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chief of construction when shipments are ordered. After the cement has been tested and accepted these will be completed by the representative of the Bureau of Standards at the works. Records of tests and inspection will be kept by the Bureau of Standards and will be available for examination by the Reclamation Service. When shipments are to be made from works near a reclamation project where no permanent inspector is maintained by the Bureau of Standards, the Reclamation Service will, if feasible, furnish an inspector from such project, if requested by the Bureau of Standards.

The Bureau of Standards will also make tests and analyses of concrete and concrete aggregates, chemical analyses of water and soils, and other tests and analyses required by the Reclamation Service. Pending the final provision for the complete maintenance of these laboratories by the Bureau of Standards, the necessary funds are to be supplied from the appropriation for the work of the Reclamation Service.

The Autocar Co., Pittsburgh, Pa., is building a large machine shop at Ardmore, Pa., where its plant is located. The American Bridge Co. will erect a steel building for this shop.

The International Motor Truck Co., Allentown, Pa., has completed the order received from Great Britain for 150 Mack "Bulldog" trucks. Each will have a capacity of five tons and is meant for service at the French front. All the trucks went to New York on their own wheels for shipment across the ocean. During June the plant turned out 140 trucks, but in the future will not try to exceed the usual rate of 125 a day.

The Federal Motor Truck Company, Detroit, Mich., announces the election of W. C. Rowley, for some time a member of the board of directors, to the position of vice-president in charge of sales, succeeding J. F. Bowman, resigned. Mr. Rowley assumes his new duties August 16. Mr. Rowley has been connected, in various capacities, with the Michigan Central Railroad for 32 years. In 1903 Mr. Rowley became general freight agent at Detroit, from which he resigned to take up his duties with the Federal Motor Truck Company. Mr. Rowley has been for several years a member of the board of directors, and at the same time one of the largest stockholders of the Federal Company.

Another Course in Concrete.

A Short Course in Concrete with the co-operation of the extension division of the Portland Cement Association has been arranged, on which occasion industrial arts and vocational teachers will have the opportunity to acquaint themselves with the fundamentals required for the successful teaching of this subject. The course will be held from August 13 to 31, inclusive, at George Peabody College for Teachers, Nashville, Tenn. The course will include lectures, demonstrations, classroom and laboratory work. Several topics in the course will be illustrated with motion pictures, lantern slides, charts and models. Opportunity will be offered for practice in the various types of concrete work. Schools which are regularly carrying on concrete classes will be asked to send course outlines, drawings, report forms, and photographs, as well as specimens of their form work and concrete exercises, which will be on exhibition during the course. The general outline of the course follows:

1. Materials for Concrete Tests. Methods of Selection. Proportioning.
2. Mixing and Depositing Concrete.
3. Tools and Equipment for Industrial Arts Work with Study of Steel Test Pieces and Units.
4. Forms for Simple Exercises.
5. Surface Treatment.
6. Methods for Curing Concrete Products.
7. Watertight Concrete. Methods of Repairing Leaky Cisterns and Tanks.
8. Fundamental Principles of Reinforcing.
9. Concrete Highway Construction.
10. Practical Problems for Concrete Courses. Relation to Individual's Use as a Citizen. Concrete in Wartime Uses. Methods of Meeting Wartime Demand. Through Concrete Courses. Appropriateness Element in Problem Selection.
11. Application of Plaster and Glue Form Work to Modern Building Ornamentation.

Registration for summer courses is to be made at Teachers' College, Nashville, Tenn., on regular registration days. For information apply at once to R. W. Selvidge, Peabody College for Teachers, Nashville, Tenn.

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

Austin, Tex., has retained as expert to investigate the Austin DAM FAILURE, Daniel W. Mead, Madison, Wis.

SEWERAGE IMPROVEMENTS are to be made by Milford, Ia. The engineer for the work is Chas. P. Chase, Clinton, Ia.

Bonds have been voted by Glendale, Ariz., for the construction of a SEWERAGE SYSTEM. The engineer for the work is F. Holmquist, Phoenix, Ariz.

In studying the ELECTROLYSIS PROBLEM, the city of Trenton, N. J., has had the expert engineering counsel of E. E. Brownell, Philadelphia, Pa

Barberton, O., is to construct SEWERS; plans and specifications for which have been prepared by R. Winthrop Pratt, 708 Hippodrome building, Cleveland, O.

A number of STREET IMPROVEMENTS are to be made by Pioneer, O. The engineering work is in the hands of the L. A. Boulay company, 1250 Nicholas building, Toledo, O.

East Dubuque, Ill., is planning STREET IMPROVEMENTS. The engineers for the work are M. Tschirgi & Sons, American Trust building, Cedar Rapids, Ia.

Woodburn, Ore., is to build a SEWER SYSTEM according to plans prepared by L. B. Wickersham, Chamber of Commerce building, Portland, Ore., and approved by the State Board of Health.

A $500,000 BRIDGE is to be constructed by the Sebastian Bridge district, Ft. Smith, Ark. The engineers to prepare plans and specifications are Hedrick & Hedrick, Interstate building, Kansas City, Mo.

Comprehensive SEWAGE DISPOSAL PLANS are being worked out by the Indianapolis, Ind., sanitary commission. The consulting engineer for the work is George W. Fuller, of Fuller & McClintock, 170 Broadway, New York, N. Y.

SEWERS to be constructed by Linndale, O., were planned by J. B. Davis & Son, 876 The Arcade, Cleveland, O

Larned, Kans., is to build a SEWAGE DISPOSAL PLANT. Plans for the work are being drawn by Black & Veatch, 507 Interstate building, Kansas City, Mo.

Brooklyn Heights, O., is making some HIGHWAY IMPROVEMENTS. The engineer for the work is F. R. Lander, 306 American Trust building, Cleveland, O.

West Point, Va., is to make a number of PAVING IMPROVEMENTS The plans and specifications for the work were prepared by Knox T Thomas, 502 Forsyth building, Atlanta, Ga.

Bonds for WATERWORKS improvements have been approved by New Wilson, Okla. The work is to be planned by the Benham Engineering Co., Colcord building, Oklahoma City Okla

WATERWORKS IMPROVEMENTS are proposed for Marietta, O Plans and specifications have been completed by Chester & Fleming, Union Bank building, Pittsburgh, Pa.

SEWER EXTENSIONS being made by Spring Valley, Minn., were planned by J. H. A. Brahtz, 312 Commercial building, St. Paul, Minn., and E. W. Goldenstar, I. O. O. F. building Mankato, Minn

WATERWORKS and a SEWERAGE SYSTEM are to be built by Hamilton, Mo. Plans and specifications were prepared by E. T. Archer & Co. 609 New England building, Kansas City Mo.

Confronted by the problem of inadequate FUEL SUPPLY for its utility plants, Cleveland, O., has been considering a number of propositions for municipal coal mines and for purchasing direct from mines. Prof. H E. Nolds, Ohio State University, has been appointed to investigate and report.

Municipal Journal

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CONCRETE PAVING ON CONNECTICUT HIGHWAY

Sand Hauled During Previous Winter—Elevating Loaders and Bins Used in Loading Trucks and Industrial Cars—Economizing By Use of Industrial Railway—Other Appliances Used.

Very complete equipment is being used and a minimum of labor employed in the construction of a 2-mile stretch of concrete road near Torrington, Conn. Materials are hauled by motor truck and industrial railway and most of the grading is done by means of a road grader. Sand and stone are loaded, hauled and dumped entirely by machinery. About 35 men are on the payroll and the work is progressing at the rate of about 300 feet of finished road a day. The paved portion is 18 feet wide, 6 inches thick at the sides and 8¼ inches at the center, and is laid in a single course.

The old road was of gravel and had to be changed in grade only slightly. It was first scarified, the curves straightened, small hollows filled and about three inches removed from the crown. Some hand work was necessary in the filling and straightening, but most of the material was moved by an Acme road grader, drawn by a steam roller. This scraped the excess material toward the ditches (where it was later available for making shoulders) and left a flat sub-base which, when rolled, formed the foundation for the road.

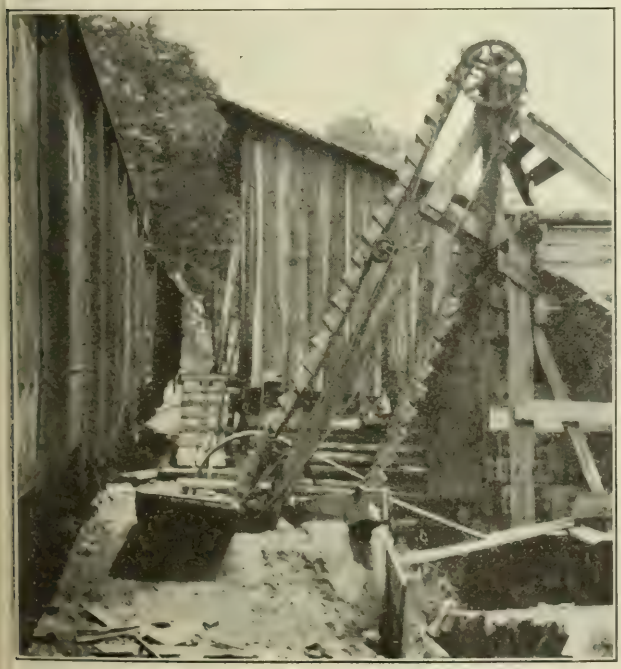
Sand was obtained from a local pit about three miles from the road. Most of this was hauled during the winter, as the contract had been awarded the previous fall and teams and motor trucks were kept hauling at odd times during the winter. The sand was dumped along the road at points where it would not interfere with traffic and where it would not wash badly. When construction work was begun, some of the sand had to be redistributed, but the amount was comparatively small.

For loading the sand into the truck, a portable home-made elevating loader was devised. This consisted of an elevator from a stone crusher, mounted on a suitable frame and driven by a gasoline engine.

Stone was shipped in by rail by the Connecticut Trap Rock Company. No overhead trestle or dump was at hand, but at a point where the siding had an elevation 6 or 8 feet greater than the road, a home-made unloader was installed. This consisted of a wooden chute under the track, an elevator from a stone crusher and an elevated bin with a capacity of 10 cubic yards. The stone, dumped from the cars into the chute, was raised by the elevator, which was driven by a 7½-h. p. electric motor, into the bin, whence it could be loaded by gravity into industrial cars or motor trucks. With this outfit, a 40-ton car of stone could be unloaded in 1½ hours.

Practically all the stone was hauled from this bin by industrial railway and the same cars were used at other times for shifting sand from place to place along the road, for grading, and for carrying sections of water pipe, which was taken up as the work progressed and moved forward. The industrial railway equipment used on this job consisted of about 12,000 feet of standard 24-inch gauge, 20-pound track, bolted to steel ties, sixteen 1½-yd. dump cars and two locomotives, one 20-h. p. and the other 30-h. p.

Two motor trucks—a Mack and a Garford—of 3-ton capacity are also used for hauling materials and supplies and have given excellent satisfaction. No figures as to cost are available, as part of the time the trucks have been employed on some of the other jobs being carried



LIFTING STONE INTO BIN.

LOADING CARS FROM BIN.

on by the same contractors. A Ford motor car, equipped with a 1½-yd. side-dump body from an industrial car, is used for general utility work.

Owing to the grades, which reach 6 per cent on the road and nearly 10 per cent on the spur from the road to the unloader, the industrial locomotives rarely handle more than 6 cars in one train; also the train length is practically limited to 6 cars because of the short loading track. Such a 6-car train can be loaded by a train crew of 2 men—the engineer and a helper—in about 10 minutes. As the unloader has a capacity of 26 tons per hour and the bin holds 10 tons, three 6-car trains can be loaded per hour, which is about the limit of the amount of stone that can be used. However, cement must be unloaded from the same track and at about the same place. This causes congestion at times and the contractors were planning to construct a loop around the railroad siding so that cars of stone or cement may be unloaded from both sides into the industrial trains.

The use of the industrial railway made possible a shortening of the hauling distance. From the unloader, the track is laid over a field a distance of about 500 feet to the road being constructed. In hauling by teams or motor truck, it would be necessary to follow a roundabout road from the unloader, adding over a quarter of a mile to the haul.

With a gang of 27 men, a Koehring mixer lays about 300 feet of concrete road daily. The standard Connecticut highway specifications call for a 1:2:4 mix. Expansion joints made of two thicknesses of Neponset tar roofing paper are placed every 35 feet. Trussed Concrete Steel Co. forms are used. The road is finished by the belt method. Sterling barrows are used for handling stone and sand.

The 27 men in the mixer gang are employed as follows: 4 men wheeling stone, 8 men shoveling stone, 2 men wheeling sand, 4 men shoveling sand, 1 man putting in cement, 4 men placing concrete, 2 men on forms, 1 man finishing, 1 foreman, 1 engineer and 1 fireman.

Water is secured by pumping from brooks or lakes along the road. A steam pump forces the water through a 1½-inch wrought iron line laid along the road. In this line plugged tees are inserted in place of couplings at intervals of 75 or 100 feet. These plugs can be removed and a faucet and hose inserted when water is needed.

The contractors on the work are Mascetti and Holley, of Torrington, Conn. Jack Healy is engineer in charge of the work for the Connecticut Highway Department.

ELECTRIC SPRINKLING TRUCK IN HARTFORD.

Hartford, Conn., operates a sprinkling equipment consisting of a 5-ton truck, electric driven, carrying a 1,200-gallon tank and an electric motor-driven pump that pumps either water or oil. There are four flushing nozzles, two in front and one on either side, two sprinkling heads in front, and two lines of road oil distributing pipe at the rear. The driver controls the operation of each of these by means of levers. The entire equipment was purchased by the street commission from the Hartford Electric Light Company. For this information we are indebted to Leon F. Peck, superintendent of streets.

RELINING OLD FIRE HOSE.

In 1910 the Seattle, Wash., fire department purchased a large quantity of 3-inch and 3½-inch hose for use by fireboats. All could not be used, and, in consequence of lying in storage for several years, the rubber lining deteriorated to such an extent that it was useless, though the outside jacket was in good condition. The department shipped the hose to San Francisco, where an entire new inner lining was inserted, making the hose almost as good as new. The cost varied from 30 to 44 cents per foot.

OPERATING THE ST. LOUIS FILTERS

Adjusting and Testing Meters and Gauges—Determining Most Effective Operating Details of Filter Washing —Mixing and Applying Chemicals.

The large rapid filtration plant of St. Louis, Mo., at the Chain of Rocks, went into service in the spring of 1915. The construction has been described and referred to several times in Municipal Journal. In a paper before the Engineers Club of St. Louis, the operation of this plant and especially the trying out and tuning up of the filters was described by the engineer in charge of the Supply and Purifying section of the Water Department, C. M. Daily. Mr. Daily began his paper by a description of the plant, following which, he proceeded with a narration of the operation of the plant, which was as follows:

In commencing operation of the plant, each rate controller was adjusted and the filter unit put in service. The time required to put the entire plant in operation was about 30 days.

The adjustment and testing of the nine Venturi meters for the raw water, wash water and chemical solution, the orifice for measuring the chemical solution, and the recording pressure and elevation gauges received attention in the order given. In the meantime the operating force was instructed to wash at a low rate (18 inches vertical rise per minute), and to start the washing very slowly until all the air was expelled from the bed.

When all the machinery was in working condition, experiments were conducted as rapidly as possible to determine the best method to follow in operating the filters.

Tests for color and turbidity and determination of the bacterial content of the water were regularly conducted under the direction of the chemist, Mr. A. V. Graf, with the expectation that the results of these tests could be used daily for regulating the plant operation. It was soon evident that the time necessary for the incubation of bacteria brought these results too late to be of direct service, so that modification of the treatment had to depend upon the turbidity and color tests, leaving the bacterial results to follow later.

The following uncertain features in the operation were investigated without any preconceived ideas as to the final results: When a filter should be washed; the amount it should be drawn down before washing; the rate of commencing wash and final rate; the quantity of water to be used; the method of treating the filter bed after washing; the quantity of water that should be wasted after each wash; the rate the filter should be run and the time before raising the rate and the best rate of filtration.

When the plant was first put in operation the aluminum sulphate solution lines, which were constructed of 8-inch tiles and 4-inch fiber pipes, failed to stand the slightest pressure, and dry aluminum sulphate was added to the water in the influent flume, starting the latter part of May, 1915, and it was not until July 7th that it was added to the water in the coagulation basins. This necessarily caused slightly turbid effluent water except when a good film of mud and aluminum hydroxide was formed on the sand, which incidentally made the tu

dity tests in the filter operation of more importance an they otherwise would have been.

Turbidity tests of the effluent water were taken every n minutes from the time a filter was put in operation ntil the rate of filtration fell off, due to clogging of the nd. On several filters operating at different rates, the sults were erratic in regard to the amount of turbidity ut were uniform in the following respects: The first trate amounting to about 5,000 gallons was clear. Fol-wing this was a quantity, varying greatly and some-mes exceeding 18,000 gallons of turbid water, followed a clear effluent until the loss of rate fell off due to ogging of the filters. It was also observed that the me filter running at a low rate allowed a smaller quan-ty of turbid water to pass than when running at a gher rate. Filters having coarse sand allowed more rbid water to pass than ones having a layer of fine nd on top, the effective size being a poor indicator of e probable results. These results raised the question f at how low a rate a filter should be run to produce he minimum quantity of turbid water, and how long should operate at this rate. Tests were made on sev-al filters varying from 5 m.g. per day to ½ m.g. per ay, those being the maximum and minimum quantities hich could be automatically controlled. These results, s before, were erratic as to the amount of turbidity but niform in two respects: First, the lower the rate, the naller the quantity of turbid water passed; second, after period of from 40 to 60 minutes running at a ½ m.g. rate, e rate could be raised to any quantity which could be ontrolled without increasing the turbidity. In this ries of tests it was observed that after washing, when large amount of aluminum sulphate was added to the ater as it entered the bed, a smaller quantity of turbid ater was delivered by the filter. The turbid water ft in the filter below the wash water gutters after ashing seemed to produce a much larger floc when ixed with the influent while filling the filter, which d to another series of tests to determine, if possible, method for treating this remaining water to reduce ie quantity of turbid water delivered directly after lashing.

Various quantities of dry aluminum sulphate were lded to the water in the central gutter while filling the ed after washing. The filter was put in operation fter being allowed to stand for a length of time vary-g from a few seconds to an hour, and at the same me varying the rate of filtration. The results clearly owed that the quantity of aluminum sulphate required produce a heavy floc, about 14 pounds, and filtering ½ m.g. rate for 40 to 50 minutes gave the best re-lts, reducing the amount of turbidity often ¼ part per illion and never exceeding two parts. No advantage as obtained by leaving the bed standing for any length f time after filling.

At first, when a filter needed washing the influent was ut off and the bed allowed to operate until the wate ll below the top of the wash water gutter, when the ashing was started and the quantity of water above the nd was wasted with the wash water. Numerous tests ere made by allowing the filter to run, after the in-uent water was shut off, until the bed was drained. he results were uniform, showing a good effluent until e water level was far below the top of the sand, but e imprisoned air in the sand usually broke the film, acks appearing along the walls and a contraction of e film seemed to cause checks as the water reached a oint a few inches above the sand. Undoubtedly a poor fluent would be produced by the water passing through e broken film, but all the water in the underdrain stem and gravel must pass before this water could reach the effluent flume, so there was no danger in drawing the water down to within an inch or two of the sand. If the water is drawn below the sand, packing occurs and the bed does not break up properly when washing, hence nothing is gained by drawing the water below the film of the sand.

The amount of filtrate necessary to be wasted after washing was studied and conclusions reached that it was unnecessary to waste any water with the adopted method of low rate filtration for one hour and treating each bed after washing.

As to the amount of wash water required and the best rate of washing, some uncertainties still exist, and probably will continue, as the kind of material carried in suspension, the time between washings, and the quantity of aluminum hydroxide on the sand greatly influence the quantity of wash water necessary at any rate of washing. At first a low rate of wash was used, about 18 inches vertical rise per minute; this was continued for about six months, resulting in the formation of mud balls varying in size from ⅛ inch in diameter to 1½ inches in diameter, most of them being of the smaller size; the rate was then raised to 21 inches and finally 24 inches per minute vertical rise, at which rate some of the smaller particles of sand would rise nearly to the wash water gutters. The high rate seemed to prevent the increase of the mud balls but did not eliminate the ones already formed. Screens having ¼ inch mesh mounted on wooden frames were drawn through the sand while washing; usually after screening the sand in this manner from five to ten times, most of the mud balls were removed, but unless there was a very even distribution of wash water, spots or hard lumps in the sand would occur.

On one filter bed (No. 34), it was found that the north side washed at a much higher rate than the south side. The north side was cut off with blank flanges and on washing the south side alone it was found that the greatest amount of wash water possible to get through this side was 9,600 gallons per minute, or 22 inches vertical rise per minute with the maximum head of 35 feet on the strainer system. All the sand and gravel was removed in sections and many of the holes in the strainer plates were found to be plugged with cement and sand grains. The holes were cleared by hand at a cost of $150, and when put in service, the cleaned side washed at a slightly greater rate than the other side.

It was very difficult to determine a slight difference in the rate of washing of the two sides, and in order to have some means of determining this a device was constructed for collecting samples of sand simultaneously at various distances below the wash water gutters while washing. This sand collector consisted of 15 telescopic cans 3 inches in diameter and 3 inches high provided with ¼×¾ inch openings near the top, covered with rubber slip valves, each can having an air vent projecting above the water when submerged. The cans were mounted on a suitable wooden frame and lowered into the sand while washing, the slip valves removed, thus obtaining samples of sand at various depths. From these samples the distance from the top of the wash water gutters to the sand while washing was determined within 3 inches, and the location of mud balls as well as the grading of the sand was shown.

Observing the action of the sand in clear water while washing, it is interesting to see how smooth the sand bed becomes, how scarcely any action can be seen, no scrubbing or boiling, merely isolated sand grains suspended in a steady upward current of water. In contrast with this, the boiling action of an air wash must

at least possess a scouring action not possible to obtain with the modern high-rate-of-wash filters.

The washing of a filter seems to be largely a matter of judgment, the rate being governed by the height to which the sand grains rise, but this should not be high enough to allow sand to overflow into the gutters. The higher rates seem to produce the best results with a minimum quantity of water.

In beginning a wash, if the rate is high, violent explosive actions occur in the bed, due to imprisoned air, which in some cases tear large holes in the sand, rolling the film of mud together, producing mud balls and leaving portions of the bed unbroken. This condition was avoided by first starting the wash at a very low rate, about 3 inches vertical rise per minute, and continuing until all the air is expelled. This method also avoids destructive ram action on the strainer system.

Measurements of the quantity of imprisoned air in a filter bed are now under way; from eight observations made from June 1st to 10th, 1917, the average quantity is approximately 380 cu. ft. of free a.

Samples of sand through a vertical section of several beds were collected by driving two 1¼ inch angle irons through the sand to the gravel after draining the bed, so as to inclose a pyramidal section which could be withdrawn and trimmed to a uniform section. These sections were divided into several equal lengths and washed clean in a definite quantity of water, the turbidity of which was proportionate to the quantity of sediment in any vertical section of the bed. It was found that most of the sediment was in and above the top ¼ inch layer of sand and below 6 inches from the top, the amount of sediment in the sand remaining nearly constant during the whole period of filtration and washing.

Some difficulty was experienced by the operators at first in judging the rate at which a filter was being washed. Opening the wash water valve a certain amount did not always give the same quantity each time, due to difference in elevation of the water in the wash water tanks, and also to the frictional resistance in the bed. This led to the installation of a low friction rotary switch which was operated by the rocker arm of the recording switch of the wash water Venturi meter. This switch controlled a current to three electric lights mounted at the south end of the plant, allowing one lamp, a green one, to light when the rate of wash was between 5,000 and 17,000 g.p.m. and a white lamp to light when the rate was between 16,000 and 20,000 g.p.m. and a red lamp to light when the rate was above 20,000 g.p.m. These lamps can be seen from any operating table in the plant and allows the operator to wash any filter with a variation of not over 5 per cent in the rate of wash. This device has proven very satisfactory and no inaccuracies of the Venturi meter have resulted from it.

The aluminum sulphate used in connection with filtration is bought in bulk, the lump usually being under 2 inches in the greatest dimension; it is shoveled from the cars into an elevator boot where it is elevated to the top floor of the head house, and by means of cross conveyors is dumped into any one of the six hopper bins. It is taken from the bins below through vertical chutes emptying into steel weighing buckets running on a trolley. A definite weight is dumped from these buckets into a concrete dissolving box, where it is dissolved by a stream of water passing through it into storage tanks below. After dissolving the contents of one dissolving box, the tank underneath is filled with water to make a definite percentage solution of the chemical. From these tanks the solution is pumped to orifice boxes at both ends of the filter plant. In these orifice boxes the level of the solution is maintained at a constant head by pumping a greater quantity than that used, the overflow returning to the storage tanks. The opening of the orifice is varied in size by means of a nearly conical plug. This plug on three of the orifices at the north end is operated by motors controlled by floats in tubes connected to the two 8-foot Venturi meters through which the water to be filtered passes, so any ratio of solution to the water to be filtered is maintained automatically through a wide variation in the amount of water passing the 8-foot meters. The solution from the orifice passes through 4-inch Venturi meters, which record the rate of flow, and is discharged into the water before entering the mixing basin north of the filter plant.

The solution from the hand controlled orifice boxes is discharged into the influent flume after passing through recording Venturi meters.

The chlorine is, at present, purchased in steel cylinders containing about 100 pounds of liquid chlorine. The chlorine is measured by four indicating rate-of-flow machines and goes into solution in rubber towers filled with pumice stone by allowing water to trickle down through the tower, the gas discharging into the bottom of the tower. The corrosive action of the gas when moist is very great and a lot of time and care is required to maintain in proper condition those metal parts of the machine which come in contact with the gas. Chlorinated oil from the gas requires the rate-of-flow machines to be cleaned about once a week.

The filter plant is heated by three 150 hp. boilers located in the head house. The system used is Webster's vacuum system. There are about 3,200 square feet of cast iron radiators and an average temperature of 68° was maintained in the plant when the outside temperature was 6° below zero.

The average costs for labor, material and general maintenance for the period between June 1, 1915, and April 1, 1916, and the succeeding twelve months are $2.47 and $2.05, respectively, per million gallons. This cost does not include the lime and iron used in softening and coagulation, but does include the aluminum sulphate and chlorine.

During the year ending April 1, 1916, 1.84 grains of sulphate of iron and 5.57 grains of lime were used per gallon of water pumped into the basins; during the year ending April 1, 1917, 0.72 grains of sulphate of iron and 5.23 grains of lime per gallon were used, making a total cost of purifying the water before adding the aluminum sulphate at the filter plant, for the year ending April 1, 1916, $4.37 and for the year ending April 1, 1917, $3.5[illegible] per million gallons.

OPERATION OF STREET FLUSHER IN VICKSBURG.

The following figures concerning the operating of a motor street flusher in Vicksburg, Miss., are given by A. M. Paxton, city clerk, and apply to the year 191[illegible] The flusher was Etnyre's high-power flusher, mounted on a 3½-ton Federal truck.

During the twelve months, this machine flushed 20,097 blocks (length of block not given), the number per month varying from a maximum of 1,999 in November to a minimum of 804 in March. The water used totaled 10,160,200 gallons. Of gasoline, 3,151 gallons were used, the cost varying from 20 to 23 cents. Oil cost from 45 to 62 cents per gallon, and 78 gallons were used. The total cost per month, including grease and accessories, varied from $31.66 in March to $75.09 in May, the total for the year being $732.02, or about 3.6 cents per block for gasoline, oil, grease and accessories.

AIR DRILLS FOR REMOVING PAVEMENT SURFACES

Use by Four Cities for Making Cuts in Bituminous and Concrete Pavements—Different Tools Used and Some Cost Figures.

By use of a portable rig equipped with compressed air drills the Public Works Department of Portland, Oregon has effected a material saving in the cost of cutting pavements for repairs and for water main and sewer construction. The machine is owned by the Northwestern Electric Company of Portland and is used by them for all pavement cutting work. It is rented by the city for its work.

The machine is a portable rig equipped with a 15-H.P. gasoline engine, driving a 9 by 11 Chicago pneumatic air compressor. The compressor operates two 50-pound air hammers, requiring 40 cubic feet of air per minute at 110 pounds pressure. In ordinary practice about 80 pounds pressure is used on these hammers, but in cutting pavement, especially pavement with a concrete base, the higher pressure greatly increases the output of work. It has been found, however, that an increase over 110 pounds pressure causes the breakage of drills to become so high as to effect no additional economy.

The rig used in Portland is much heavier than is required to operate two 50-pound hammers, but it was constructed by the electric company from apparatus on hand; consequently, any economy along these lines was not made a consideration.

The cost of operation is virtually the same for the city as for the company, depending to a great extent on the cost of labor. The company's cost for cutting asphalt pavement is: With the air hammers, 7 cents per square foot; by hand, 15 cents per square foot. The company's cost for cutting bitulithic pavement is: With the air hammers, 5½ cents per square foot; by hand, 12 cents per square foot. This pavement is removed in slabs about 4 feet by 4½ feet by the method described further on. These figures are based on normal labor conditions. The present increasing cost of labor will increase them slightly.

In Des Moines, Iowa, removing concrete pavement to lay underground conduits for electric service lines by methods in use prior to the application of the jack-hammer drill would have necessitated removing whole panels, but with these drills it was possible to restrict the cutting to a strip about a foot wide. Based on the use of two drills and an electric portable compressor, the engineer's estimate was 30 cents per foot, which in working was reduced to an actual cost of 18 cents. Hand work would cost about 40 cents per foot.

Drills of the same type have been used in large numbers for taking up old concrete in New York City subway building. It is common practice, in this work, to substitute a pointed chisel for the usual rock-cutting bit. The chisel is very effective where concrete is 3 or 4 inches thick, as it permits the wedging and breaking off of relatively large lumps. Other air tools also have been adapted to cutting out concrete pavements. In some instances a large pneumatic riveting hammer fitted with a suitable chisel has been found an excellent pneumatic pick. In other cases the pneumatic tie tamper fitted with a sharpened pick has been found convenient.

For taking up asphalt paving the tie tamper fitted with a chisel about 3 inches wide is used. First the tool is used for making a cut which marks the slabs to be removed. Then the tool is held upright, as in Fig. 2, and the pavement is cut through and pried up. At Elmira, N. Y., four men removed approximately 600 square feet per hour, at a fraction of the cost of hand work.

Another tool also used for the same work is a smaller hand pick. With this tool, narrow grooves are cut, marking the portion of the asphalt to be removed, at an average rate of 20 lineal feet per hour. (See Fig. 3.)

Bitulithic pavement, being softer and of a somewhat sticky nature, is removed in a slightly different manner. A chisel some 1½ or 2 inches wide is employed to make a series of cuts, each the width of the chisel and spaced about 2 inches apart. Cuts of just sufficient depth to

FIG. 1.—BREAKING CONCRETE WITH HEAVY AIR HAMMER.

FIG 2.—CUTTING ASPHALT WITH TIE TAMPER.

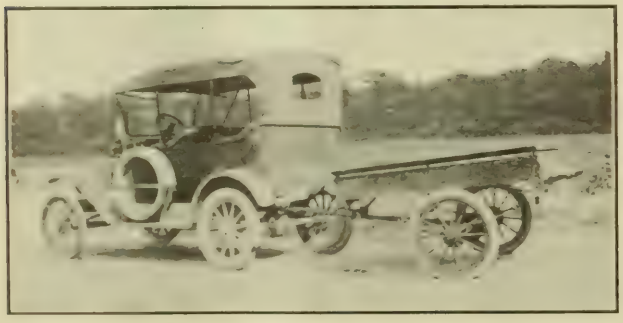
FIG 3.—CUTTING ASPHALT WITH PNEUMATIC PICK.

mark a distinct cleavage line are made on one side and the ends; the pavement is cut through on the remaining side, a crowbar is slipped under and the block or slab of pavement pried out.

A slight break in a bituminous surfaced macadam road quickly develops under heavy traffic into a deep rut, and the pneumatic pick has been used to loosen up the roadbed as soon as a weak spot develops, additional crushed stone being placed and the spot compacted by a pneumatic tamper.

UTILITY CAR AND TRAILER.

The outfit illustrated herewith is used by E. C. Humphrey, Inc., contractors of Hackensack, N. J. The trailer is made from the rear wheels of an otherwise worn-out Ford, equipped with springs and a light body. The outfit can carry 4 men—or more in a pinch—and several hundred pounds of materials or supplies rapidly over any passable road. For getting men and supplies



A HOME-MADE TRAILER.

to a point in short time or for rapid transportation of articles of small bulk it is a valuable adjunct to the contractor's transportation equipment. The cost of operation and maintenance is low and the trailer can be uncoupled at any time.

ROAD WORK WITH CONVICTS IN IOWA

Conclusions from Three Years' Experience—Methods and Appliances Used—Cost Figures—Where Convicts are Used Advantageously.

During the past three years the Iowa Highway Commission has been using prisoners for road work at the various state institutions. During the first two years, in beginning the work, it was not expected that the same efficiency would result as would be possible after an organization was perfected and experience had shown the profitable ways in which prison labor could be used. The commission considers that the results of the 1916 work make a very good showing for convict labor.

In constructing a road at the State Hospital at Cherokee, work was started on an excavation which had been opened by a steam shovel and the work of trimming and shaping the banks made the cost run as high as 32c a yard; later this cost was reduced to 22c. The material was very hard and necessitated extra teams for ploughing. The men loaded the earth into Koppel cars by shovels, some days handling as high as twenty yards per man. On work of similar character at the Iowa State College farm, where a deep cut was necessary to reduce the grade of the road, Koppel cars were also used successfully. These were loaded by shovel and formed into trains of four to six cars, which were allowed to coast down the grade to the point where earth was needed for a fill. This same gang also constructed a reinforced concrete viaduct at a total cost of $7,375.37, of which $1,134.22 was chargeable to the convict labor. With the exception of one carpenter, the superintendent-in-charge and teams used in hauling, the convicts did all the work.

The men in this gang were not skilled workmen, but were willing to work hard and were apparently anxious to make good on their work. They turned out a quantity of work far beyond the expectations of the commission. It is doubtful if it is possible to get together an equal number of free laborers who would perform the same amount of work.

The cost of road work let by contract at Woodward was 21c per cu. yd., at the Iowa State College 25c, at Rockwell City 25c and at Council Bluffs 24c. The cost of earthwork using prison labor at Cherokee was 28c. It should be noted also in this connection that the crew used at Cherokee did more work than could be expected from the average prison labor. The cost of earthwork at this place during 1915 with a different crew was about 38c per cubic yard. The average cost at Iowa State College in 1915 on part contract and part prison labor for road work was 30.1c. The cost of tiling by prison labor at Woodward was 11c per foot and at Rockwell City by contract 7.8c per foot. On the same depth of cut, the costs would have been almost exactly equal.

The cost of concrete used for encasing tile, placed by prison labor at Woodward, was $14.69 per cubic yard concrete in box culvert work cost $10.80, and in bridge extension work, $11.70. The cost of the concrete work by contract at Council Bluffs was $15.

From these comparisons it will be noted that on road work on which teams and earth moving machinery can be used, convict labor cannot compete with contract prices. It would not be practicable to attempt to outfit

crews of prisoners with teams and machinery for this character of work. The only places where convict labor can be used with economy on earthwork would be where there are large yardages of dirt to be moved within narrow limits, where industrial railway equipment can be used to advantage. In such instances, the cost of convict work can be kept near the cost of contract work if picked crews are used. It is possible to use convicts in laying tile for road drainage or other purposes that require hand labor without special equipment.

The Iowa Commission believes that the only place where prison labor can be used profitably is in the preparation of road materials or in the loading of such materials for distribution to counties. An exception to this is the employment of prisoners to perform the necessary work at various institutions where labor is not available from the inmates and in some county work. The permanent road work of the state can be done better and more economically by contract.

While the best service for which prison labor can be used in road improvement is in the preparation of materials, such as furnishing stone or gravel from quarries or pits, the ultimate object of the employment of convict labor is the development of the prisoner himself. The men who have constituted the road camp and who have come under the observation of the commission have benefited physically and mentally. These men have been paid at a rate varying from 20c to 25c per hour, the rate for 1916 being 22½c. Many of these have saved some money and have been able to assist those dependent upon them. The state has benefited from the employment of these men as their entire living cost, including the expenses of guards and transportation, have been paid from their earnings.

The state of Iowa does not have road building of the character that has been quite successfully handled by some states with convict labor, where a large amount of manual labor was necessarily employed, nor does it have the same character of prisoners as do some of the southern states. These differences must be recognized in the methods adopted to utilize such labor.

FAULTY CONSTRUCTION OF WOOD BLOCK PAVEMENT.

A recent inspection of Chapin parkway in Buffalo, N. Y., showed neglect of a precaution in construction which has caused much trouble in maintenance of the street surface, and replacing of the blocks in the same manner is giving opportunity for a return, at least in part, of the same difficulty. The drainage of the surface of the pavement base seems to have been faulty, so that water reaching it did not drain off rapidly. The blocks were laid on a sand cushion of perhaps 1½ inches depth and the lugs on sides and ends of blocks made the sand-filled joints about ⅜ inch wide, so that traffic passing over the pavement when the cushion was saturated with water was able to churn up the sand and displace it so that it was collected under some blocks and removed from beneath and between others, thus making the surface of the street very uneven.

Some months ago Geo. W. Tillson inspected the pavement and recommended that it be relaid on a mortar bed with water tight joint filler, but the repair seems to have been made by relaying the blocks in the same manner, a considerable portion of the driveway in difficulty having been so replaced. There seems to have been no trouble with expansion of the blocks by absorption of moisture or otherwise, indicating full waterproofing of the blocks by the treatment to which they were subjected. Indeed, the blocks either have shrunk or were originally laid only loosely, as the joints are now equal in width to the lug depths or even more.

Similar trouble to that at first complained of has begun to develop again and one area of a very few square yards shows considerable lateral displacement of blocks and some vertical displacement by the washing or churning of sand out of the joints and out from under blocks. At several other places ridges and bulges are developing which are very evidently not due to expansion of blocks, the joints being wide and seemingly loosely filled with sand, but are rather due to displacements of the material on which the blocks rest.

RIVER CHANNEL IMPROVEMENT AT COLUMBUS

Work Planned to Prevent Recurrence of Damage Done by Flood of 1909—First Contract Now Under Way—General Plan Outlined.

The flood of 1913, which did so much damage at Columbus, Ohio, and other cities of the central west, occurred nearly four and a half years ago, and the beginning of the work of improving the channels of the Scioto and Olentangy rivers to reduce the danger of future flood damages was made on July 30 of this year, with the signing of bonds for the work, for which $3,500,000 of bonds are to be issued. Immediately after mayor Karb and auditor Ginder had signed the first bond, the first shovel of dirt on the actual construction was turned and the event celebrated by parades of city officials and citizens of the west side, who have labored hard to bring

PLAN OF PART OF COLUMBUS, OHIO, SHOWING PROPOSED IMPROVEMENTS OF SCIOTO RIVER.

Double lines indicate levees 80 ft. wide on top. Heavy lines, retaining walls. Hatching, paving on levee slope. B, Town street bridge, to be built by bond issue. L, Rich street bridge, to be lengthened by bond issue. C, C, bridges to be lengthened or built by county. R, R, bridges to be lengthened by railroad companies.

about this improvement in a form which will give as great insurance against future flood damage as they felt themselves able to afford, even with material aid from the city at large. Part in the ceremonies was taken by director of public service Borden, councilman Westlake, city attorney Scarlett, city engineer Maetzel, county commissioner Sinclair and the mayor and city auditor.

The contract which begins this work is one for the extension of Rich street bridge to make it conform with the enlarged waterway. The work consists of adding two spans to the west end of the bridge and involves excavating 3,170 cu. yds. of earth above low water at $1.65; 2,280 cu. yds. below low water at $4.25; concrete footings for piers and abutment, 730 cu. yds. at $8; and 2,320 cu. yds. of concrete above the footings at $8.70. The old west abutment will be turned into a pier with stone facing on all sides, there being 215 cu. yds. of stone work at $10; 3,360 lin. ft. of wood piles under the piers and abutments and 2 M ft. of wood sheet piling at $120, complete the more important items of the contract.

For girders for the two spans there will be used an old bridge a short distance down stream, which will be taken down and re-erected for a lump sum of $11,320. A new steel floor, lateral bracing, sidewalk brackets, etc., will require about 227,800 pounds of steel at 8.8c., and 800 lin. ft. of hand rail will be set at $5.50 a foot. The floor will be of creosoted timber, there being 800 sq. yds. at $2.60 a yd., and 45 M of timber at $80. The contract totals about $90,000 and was awarded to the Capitol Construction Co This bridge is marked L on the accompanying map.

The next contract to be let in connection with the channel improvement probably will be for a new seven-span reinforced concrete arch bridge at Town street (marked B on the map), plans for which will be ready about October 1. Several other bridges within the limits of the channel improvement will be built by Franklin county, and their cost is not included in the three and one-half million bond issue. One of these bridges, plans for which have been prepared by Fleming & Knollman, as engineers, will probably be contracted for late in August.

Detailed plans for other parts of the work have not yet been completed, but the general plans (subject to some changes as the details are developed) may be described as follows:

By common consent the minimum width of the new channel in the Scioto river through the center of the city has been fixed at 580 ft. With the available height of levee, this width will not carry the estimated maximum flood flow, although it will very nearly carry what was estimated to have been the flow of the 1913 flood. The plans provide for a relief overflow located as described below, which will reduce to a minimum in area and amount the damage due to this possible but not probable excess of flood over capacity of channel. It is believed that the chances of damage by this plan are small enough to warrant the great reduction in cost secured by a 10 per cent reduction in capacity. It is estimated that the bond issue will pay for the land to be purchased, the bridges to be lengthened and rebuilt (not including those to be constructed by the county), the retaining walls, levees, boulevards on part of the levees, bank and levee protection, the dam at Starling street, and all work connected therewith. This allows for excavating, within the width of the channel, sufficient earth to build the levees, but possibly not to remove all the earth required to bring the bottom of the new channel, outside the present low-water channel of the river, to a level slightly above low-water. Such excavation is necessary, however, in order that the new channel may have as much capacity as possible and still provide for concentrating the low-water flow to at least as small a channel as carries it at the present.

The water in the river is now deepened in front of the city during low-water by means of a dam near Starling street, the object being to prevent the creation of unsanitary conditions by sewer overflows and other drainage channels, the flow from which might produce nuisance if spread out in a thin sheet over an exposed channel bottom. The flood-water channel bottom is designed with a profile to prevent this except for the brief period when a moderate flood first rises out of the low-water channel, or is just falling back into it. A new concrete dam will be built to take the place of the old wooden dam, about 18 ft. high above the base, some 6 ft. of the lower part being below the bed of the stream. Flash boards can be put on this dam to regulate the time that the water will lie on the bed of the flood channel outside of the low-water channel, or for any other purpose. A study of the effect of this dam on the elevation of flood water shows that it raises it less than 1 ft. at any point above it.

According to present plans, the 580 ft. width of channel will extend about one-quarter mile south of the Mound street bridge. Below this point the present channel is quite wide, and levees will be built along it, probably using material excavated from the channel above. No improvement has been planned for the present beyond Schiller street and the Hocking Valley railroad, pending the settlement of some questions of plans for other affected work. Wherever not mentioned as otherwise protected, the river above this point will be provided with levees, these in some cases being 80 ft. wide on top so as to give room for a boulevard, in other places the width being about 16 ft. On the east side of the river there will be a boulevard from Schiller street to Mound street; and on the west side from Rich street to Broad street.

Along some stretches retaining walls will be required, generally because the levee would encroach upon buildings or valuable area. The retaining wall on the west side will probably be left about 2 ft. below the working level of the levees so that it can serve as a relief overflow to prevent the flow overtopping the levees. In the preliminary plans this wall is of reinforced concrete set on piles, with a base 21 ft. wide and 2½ ft. thick, set 4 ft. below water level and carrying a retaining wall 24 ft. high, 7 ft. wide on the base and 2 ft. wide under the coping. The present surface of the ground is about 9 ft. below the top of this wall, and any water flowing over the wall would find its way over the streets and southward through the city behind the levee; but the amount of water so flowing would be but a very small per cent of that which did so much damage in the 1913 flood.

On curves and wherever else it may be necessary, the slope of the levee will be protected, probably by concrete slabs or stone paving. Where the latter is used, the stones will be set beginning at the top of the levee slope and will slant back so that, if the lower stones are displaced, those above will not fall down the slope.

The railroad bridges will be lengthened or reconstructed by the several companies at their own expense, and, as stated before, the county will lengthen the county bridges across the river.

The estimate on which the $3,500,000 bond issues was based included $1,750,000 as probable cost of land to be purchased; but the board of appraisers has fixed the value of this at about $750,000, and it seems probable that the cost of proceedings and all other expenses will not increase cost of the land beyond $1,000,000. It is hoped therefore that the entire work can be completed within the estimate, although the present high prices for materials and labor may continue for some years and affect the cost unfavorably.

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INJUSTICE TO PAVING MATERIALS.

A brief article in this issue refers to a piece of wood block pavement which is getting into bad shape through no fault of the blocks, but which will probably lead many who are not well informed on the subject to condemn all wood block pavements. In this case the trouble has apparently been due to the use of a too thick sand bed as a cushion and sand as a joint filler, which fail to provide firm support for the block.

Recently in New York we saw a patch of wood block pavement that was rapidly becoming a mere lot of loose chips, which were being scattered over a considerable area. The pavement surrounding this patch is in good condition, but the average citizen, looking at the pavement, would probably have his attention held by the bad hole that is rapidly forming, and condemn all wood block. There is of course only one explanation of this condition—in repaving over a cut the blocks were laid with their fibers horizontal instead of vertical. The result is the fault not of the wood blocks but rather of the wooden head of the man who relaid them.

Wood blocks have happened to be involved in both of these instances, but the same conditions can be found in connection with other paving materials. Concrete pavements, for instance, are more largely dependent for success upon the work of mixing and laying than upon the quality of the cement used, and a poor concrete pavement should not cause condemnation of either the cement used or such pavements in general. The same is true of asphalt. Brick and stone block are somewhat more fool-proof. But we doubt whether there is any kind of pavement laid of which some faulty samples cannot be found, and no one should condemn any of them on such evidence alone unless expert analysis has revealed the cause of the defect to lie in the material. A good pavement, showing what can be done with a material, is more convincing evidence than a poor one that merely shows what improper use can do with it.

HEALTH DEPARTMENT LABORATORIES.

The establishment of a laboratory in a health department is undoubtedly a mark of progress. Its service in diagnosing cases of infectious diseases cannot well be given by any other department. The good will of the physicians of the city depends to a large extent on the efficiency of the department laboratory—and in these days of increasing resentment of the practitioner against the growing municipalization of public health activities, this good will must be fostered with greater care. The department laboratory must give good service or else the physicians will feel justified in opposing extensions of the city's work as political rather than necessary.

The mere existence of a bacteriological laboratory is not sufficient, and recent incidents draw attention not only to its uselessness but even to positive danger unless the laboratory is properly managed. According to an item in this week's issue of Municipal Journal the work of a substitute bacteriologist in a New England city recently created a false alarm of a diphtheria epidemic. He was turning in positive reports on three-quarters of his specimens when the regular bacteriologist, working in alternate periods, was reporting normal conditions. Then there is the story of the bacteriologist in the department of a large city who developed an amiable optimism regarding the presence of diphtheria in the city. When an epidemic of the disease swept the city it was discovered that his routine diagnosis consisted of throwing all specimens into the waste basket. Only a few months ago a board of health had to pay the expenses of a patient to whom diphtheria anti-toxin had been administered following a mix-up in reporting a diagnosis.

There is an urgent need of better supervision of health department laboratories. There must be a more accurate routine and provisions for adequate checking and proper reporting. Competent chemists and bacteriologists must be employed and a careful control exercised over all assistants. The requirements of modern epidemiology must be met or the health board cannot justify its existence. The diagnostic laboratory is vital in fighting disease. It is the first line of defense against an epidemic. It should be even more than this—it should act as the outermost patrol—the scout service.

PUBLIC INTEREST IN PURIFICATION PLANTS.

Water works engineers and officials throughout the country are not the only ones interested in the large rapid filtration plant at St. Louis, but the citizens of that city take considerable interest in it, many thousands of them visiting the plant and the park surrounding it during the spring, summer and fall of 1916. Believing that confidence in the plant would be increased by a more intelligent knowledge concerning the purification process, the department stationed a guide there whose duty it was to explain the operation of the plant to the visitors. One of the points which excited the greatest interest was the addition of the chemicals to the water and the mixing of the two which takes place in the mixing conduits. In order to encourage this popular interest and give a better opportunity for watching this process, the officials removed the iron floor plates that covered the conduits at the points where this action takes place, protecting the openings by erecting an ornamental iron railing around them.

The WEEK'S NEWS

State Highway Events in Massachusetts and Michigan—State Health Work Reorganized in Maine—Newport's Diphtheria Epidemic—Springfield, Ill., Waterworks—The Kansas Natural Gas Fight Decision—Fighting Utility Poles in Brooklyn—Firemen and Police Win Strikes for Higher Pay—St. Louis to Vote on $18,000,000 Improvements—Economy Fires Employees in Springfield, Ill., Oakland, Cal., and Portland, Ore.—Connecticut's New Billboard Law—Capitol Improvements in Harrisburg.

ROADS AND PAVEMENTS

Road Builders Protest Against Freight Service.

Washington, D. C.—At a meeting of road building men held at the Automobile Club of America, a resolution was adopted providing for a committee to take action looking to carrying into effect other resolutions then adopted and specially that part thereof referring to the shipment of road materials. The chairman was given power to name the committee and to add thereto. After several attempts to arrange for a conference between the committee and the commission on car service of the railroads' organization for the war, such committee members as could be assembled, with Col. E. A. Stevens as acting chairman, met the commission at Washington. There were present on behalf of the comittee, Messrs. Geo. P. Coleman of Virginia, H. G. Shirley of Maryland, M. B. Greenough of Ohio, E. L. Powers of New York and Col. E. A. Stevens of New Jersey. It was at once apparent that there was no desire on the part of the car service commission to place any embargo on road materials, but rather a willingness to expedite shipments as far as possible. After a full discussion it was the unanimous conclusion that this end could best be reached by furnishing the commission with such evidence as will aid the latter body in securing a maximum efficiency in the use of cars, each case of delay being dealt with on its own merits. In order to give this aid it is necessary that the commission be informed of cases where cars now returned empty could be used, of the dates, places and car numbers and initials of delayed shipments, of the causes of delay and of any remedies suggested to secure improved service. Any early increase in efficiency of transport of road materials can be attained only by a more efficient use of the present equipment and not by any addition to the number of cars. The committee believes that accurate and detailed reports of instances of failure to utilize present equipment to the best effect will be of material help to the commission on car service and will be welcomed by it. The committee would, however, deprecate complaints unaccompanied by such facts and suggestions as will be of help in meeting the difficulties of the situation.

Massachusetts Takes All Financial Risks in Contracts.

Boston, Mass.—The state highway commission is carrying on some of the road work under its charge by new forms of contracts, designed to shift to the state the burden of extensive charges for labor and materials and the responsibility for delivering materials when needed. Under existing conditions no contractor can afford to bid on extensive road work except at a price high enough to save him from loss in case labor and materials increase greatly in price. Under ordinary conditions an experienced contractor can foresee changes in such prices and allow for them, but he cannot do so at present and consequently his bids on work are very high. It is not believed that these high prices on materials and labor will continue, and the new form of contract used in Massachusetts will enable the state to save considerable money when both labor and materials can be procured at a lower rate than the contractor now believes it safe to figure on. Last May the state made a contract with an experienced highway contractor under which it agreed to furnish all the machinery and materials and the contractor agreed to furnish all labor, teams and small tools. The books of the contractor are kept in detail and are open to the examination of the state highway commission at all times. The commission pays the contractor for his labor expenditures every week or every fortnight, and it also pays for workmen's insurance. Maximum limits have been set for the pay of labor, but these can be increased by mutual agreement should necessity for doing so arise. The other expenditures of the contractor are paid back to him monthly by the commission. The contractor receives for his overhead expenses, personal services, the use of small tools and for his profit, an agreed upon sum for each unit of work performed, these prices being made out on the basis of so many cents per cubic yard for gravel surfacing, so many cents per ton for local broken stone in place and rolled, so many cents per foot for pipe, and the like. Another form of contract that is used has been adopted when all bids for a job were considered too high. In such a case an arrangement has been made with the low bidder to do the work at actual cost plus an amount for profit and overhead expenses figured on the unit of each class of work, as 7½ cents per cubic yard for excavation. Under this contract the contractor supplies labor, tools and machinery and pays his liability insurance, while the highway commission furnishes the materials, and pays the contractor his actual expenses. If the actual cost of the work proves less than the original bid, the contractor shares the saving equally with the highway commission, but the contractor in no case is to receive more than his bid. Under this form of contract the state is assured that the work will not cost more than a specified sum and if the expense of construction is less than the contractor estimated, the state will obtain the road at a lower price than the original bid.

Detroit May Do Own Paving.

Detroit, Mich.—Detroit will be enabled greatly to facilitate paving construction under a forgotten clause of the municipal charter found by corporation counsel Dingeman. The clause provides that the council has power to authorize paving by the department of public works without resorting to competitive bidding by contractors. Under this provision the city can supplement the work of contractors unable to complete all desired paving promptly, and can provide greater use for the municipal asphalt plant, which has been utilized only in patching and resurfacing jobs. The charter provides that the cost of paving a street, which is assessed against abutting property owners, shall be determined by competitive bidding, but the newly discovered clause supplements this provision with authority for the council to direct the city to do the work, "if advisable," and determine the assessment on the cost when completed. The clause was inserted in the charter in 1899 for the express purpose of providing a weapon against fraudulent contractors, Mr. Dingeman said. Commissioner Fenkell sought to learn if his department could enter competitive bids against contractors for paving jobs, his object being to obtain sufficient work to keep the city asphalt plant going. The plant has had plenty of work but the prospects pointed to inability to use it to full capacity soon unless new paving jobs could be done by the city.

Michigan Road Law Again Upheld.

Lansing, Mich.—Following an opinion handed down by the supreme court, upholding the constitutionality of the Covert highway law, highway work in various stages of completeness throughout Michigan and representing approximately $7,500,000, will be resumed. However, highway department officials say it will be too late this season to accomplish anything in the way of extensive work. The

supreme court's opinion affirms the decree of the Ionia circuit court which declares the act constitutional, notwithstanding the fact that it contains an inconsistent clause. The claim was advanced that a clause providing for maximum percentage limits would nullify the rule of assessing according to benefits. The courts hold that inasmuch as this clause is not an interdependent part of the rest of the statute "essential to accomplish its moving purpose and the chief object for which it was enacted," and that it might be eliminated and still leave a workable law, the act is constitutional. Two hundred and four road jobs, covering 1,100 miles of road, 700 miles of which is on trunk line highways, and representing a total cost of seven and a half million dollars hung on this decision. The work includes that started during the two years since the enactment of the law, and the completion of which will require two additional years, since the present year has been wholly lost. The decision also affected $2,500,000 worth of road bonds already issued, which of course continue to be valid as the law is upheld. There was pending by petition two projects of 40 and 60 miles respectively of trunk line road on the East Michigan Pike; the former on the Huron Shore branch, and the latter on the main route of the pike. While the season is too far advanced to start the work this year, there is time to get ready for much road improvement next summer.

SEWERAGE AND SANITATION

Health Department Laboratories Need Supervision.

Washington, D. C.—A recent report of the United States Public Health Service brings out the need of more adequate supervision of and more careful work in the laboratories of city health departments. It says: "Recently in a city in New England an unusual number of cases of diphtheria was recorded. Study of the cases showed that the diagnoses were based upon laboratory examinations. Further inquiry revealed that during the period of the unusual prevalence the examination of diphtheria cultures in the laboratory had been carried on by two different men, the usual bacteriologist and a temporary substitute who did the work part of the time. The findings of these men differed widely. The substitute bacteriologist did the work from May 27 to June 2, and of 46 specimens submitted for diagnosis he found 33 positive and 12 negative. From June 4 to June 16, inclusive, the regular bacteriologist was on duty, and of 51 specimens examined he found 8 positive and 43 negative. From June 18 to July 7 the substitute was again on duty, and of 104 specimens examined he reported 77 positive and 27 negative. From July 8 to 10, inclusive, the regular bacteriologist was on duty, and of 18 specimens examined he found 2 positive and 16 negative. The apparent prevalence of a considerable outbreak of diphtheria was evidently due to the inexperience and lack of training of the substitute. In this connection one is reminded of the bacteriologist of the health department of a large city who, instead of examining his diphtheria specimens, threw them into the waste basket and marked the reports negative, a practice that was without serious result until a diphtheria epidemic assumed unusual proportions and was discovered only by accident."

Reorganizing Maine's Health Work.

Augusta, Me.—Dr. Leverett Dale Bristol, the new health commissioner of Maine, who assumed the duties of the office a few weeks ago, is now busily engaged in the organization of the department and trying to gather together experts for the various divisions which he will inaugurate. According to a statement, "so far as is possible members of the old board of health will be considered in appointments under the new health department law. I intend also to fill these new positions with residents of Maine. The law as passed by the last legislature stipulates that the state shall be divided into at least three sanitary districts, the head of each district being expected to devote all of his time to the work of his district. Perhaps later the number of the districts will be increased as the work progresses. Dr. Bristol contemplates dividing the organization into five divisions: the divisions of communicable diseases, the sanitary engineering division, the division of diagnostic laboratories, the division of sanitary inspection and education and the division of vital statistics. The chief work in the division of communicable diseases will be the special study of communicable diseases and how they are transmitted. It will also be the duty of the director of this division to go to the community where the disease exists in an endeavor to determine the method of its spread, and in the case of typhoid fever to ascertain if possible where the disease originated. The study of water supplies and sewage disposal will be the principal work of the director of the sanitary engineering division of the health department, although he will be the director of the laboratory. His duty will include laboratory sampling and field work. The director of the divisions of diagnostic laboratories will determine the presence of disease germs in cultures and specimens. The last legislature made an appropriation of $4,000 for each of the years 1917 and 1918 to give free of charge the Wassermann test for venereal diseases and the director of this division will have charge of this new feature. The director af the division of sanitary inspection and education will give lectures throughout the state, with lantern demonstrations, concerning the causes and prevention of diseases, show exhibits at county and state fairs and distribute literature on topics relating to the public health. The work of the division of vital statistics includes the collection of records of births, deaths and marriages, the causes of death and the like, all of which will be under the direction of Dr. Bristol.

Spread of Poliomyelitis in Virginia.

Richmond, Va.—Thirty cases of infantile paralysis were reported to the state board of health from seven counties and one city during the month of July. Three cases have been reported from the city of Richmond. Acting on the basis of this information, the state board of health has issued a bulletin of warning and called upon physicians to report immediately, as required by law, all cases of infantile paralysis. "Physicians owe it to the public, as well as to the law, to report immediately all cases that occur in their practice and immediately establish quarantine. Evasion of the law, in cases of this sort, is criminal and will be punished promptly and effectively. Some of the cases that have been reported are probably of the sporadic type and need not cause serious apprehensions. Other cases apparently are of the epidemic type and may be responsible for the future spread of the disease. All cases must be treated as though they were of the greatest danger, for only in this way can proper precautions be taken. The situation has not yet assumed proportions that make it necessary to give public warning against travel in all parts of the state, but it is serious enough to justify us in saying that children should not enter or leave Rockingham county. It may be necessary to add Page and Rappahannock to this list. The board is taking steps to confine the disease, if possible, to the present area of infection and is working in co-operation with the United States public health service. For the present, the most important measures of prevention are, first, the isolation of all cases, and, secondly, the sanitation of our towns, cities and rural districts. To this end, the board has written an urgent appeal to the councils and boards of supervisors and will rigidly exercise all the powers at its command." The total number of cases thus far for the year is sixty-eight. This is less than the number reported to the corresponding date in 1916.

Diphtheria Epidemic Stirs Newport.

Newport, R. I.—The reporting of several hundred cases of diphtheria, the addition of many new ones every day and the overcrowding of the hospitals have aroused the local and state health authorities to stringent measures. Several emergency hospitals have been quickly fitted up. The epidemic, it is thought, originated in milk and ice cream from a few stores and these have been closed. The naval training station has given the use of its hospital to accommodate patients. Conditions were complicated by the city's bacteriologist, Miss Tuthill, falling a victim to the disease herself. This necessitated the sending of cultures to

Providence until the bacteriologist of the state board of health, Dr. Harry S. Bernstein, could come to the city. Dr. B. U. Richards, of the state board, after investigation said: "Conditions in the diphtheria zone are very unusual. The zone extends from Jamestown to the north end of the island, centralizing in Jamestown, Newport and Portsmouth. The board is not able to say where the disease started, who was first afflicted and who was the carrier. The board, however, has come to the conclusion that the direct cause of the epidemic has been the wholesale distribution and consumption of ice cream. We have investigated thoroughly the source of the milk supply of the district and found that in many cases it is in a very faulty and insanitary condition. The raw milk used in the manufacture of ice cream has probably been the cause of the epidemic." At the beginning of the outbreak state and local authorities conferred and organized a committee with practically unlimited authority. An order was sent out, through the police, stopping the sale of all ice cream in any store, factory, hotel, restaurant, boarding house or drug store until the premises could be inspected. Warnings were sent out broadcast urging the citizens to pasteurize or boil milk, avoid ice cream and take other sanitary precautions. The organizations at work on the situation include the state board of health, the state argricultural board and the state board of pure food control and the state factory inspection department.

City Ordered to Remove Sewers.

Peabody, Mass.—By a rescript of the supreme court, Otis Brown wins his equity suit against the town of Peabody for an injunction against the maintenance of public sewers laid by the town in 1895 in Munroe and Hardy streets—private ways to which Brown claims title, while the town claimed that the streets had been open to travel for more than twenty years. The court orders a decree to be entered awarding an injunction and commanding the removal of the sewers within five months unless the town, meantime, shall acquire a legal right for maintaining them.

WATER SUPPLY

Report on Survey of Water Works.

Springfield, Ill.—That insurance rates will be raised unless certain minimum improvements are made in the Springfield city-owned water works is brought up for discussion and comment by the Sage Foundation report on city and county government in Springfield and Sangamon county. Moreover, insurance can actually be lowered and lower rates are promised if certain additional improvements are not unduly delayed. The equipment as far as pumps were concerned was found adequate when all factors of the present situation were taken into account. The need, however, of another trunk main laid along a new route from the pumping station to the city has been pointed out. Although these and other changes proposed "would affect very few insurance rates outside of the business districts, for the most part they represent much needed improvements, and should be made. The proposed new water main from the pumping station alone will cost about $150,000 and is a clear necessity. A fund of 10 per cent of all meter revenue was being set aside to obtain money to lay this main. Again, probably $50,000 must sooner or later be expended in replacing mains which the growth of the city has proved too small, and possibly $100,000 more could be expended to advantage to meet suggestions made by the underwriters. Some of these are costs, however, which it is clear that the whole city should bear; and the necessary funds should be raised either by general taxation or by the issuance of city bonds." Moreover, many extensions are asked for by residents, but the impossibility in the past of meeting all these demands made "charges of favoritism and bad judgment possible; these tended to force the extension of the city mains as rapidly as possible into the newly developed districts, and it all added to department costs.

"Some other cities have found a very fair way to meet the difficulty was to install new mains upon the payment by lot owners of a flat rate of, say, $15 for each forty-foot lot. Of course this does not pay for the construction of the larger mains, but the cost above this amount should in any event be made a general charge over all the city.

"It is true also that heretofore mains have been laid without charge by the municipality; but since it is impossible now to extend the system as rapidly as requested without putting a too heavy burden upon the consumers of city water, a change from past methods seems warranted. Besides, the plan suggested would not be working present builders any injuries, for the city would be given a tangible value return to them for the payment required. In other words, the value of their lots, through having city water service, would be increased at least by the amount that the improvement had cost them. This equitable method of financing new extensions would reduce present Springfield rates about 20 per cent.

"The water department is to be congratulated on the practically complete installation of water meters. This very general use of meters was probably the chief factor in a reduction of the per capita consumption of water from 125 gallons in 1906 to about eighty-five gallons in 1916. In the same period the water consumption per consumer of city water was reduced from 217 to 123. The Springfield water department has corrected a very common fault by instituting a periodic test of the accuracy of water meters. The first general tests made in 1911 and 1912 are said to have shown an average loss to the city of nearly 40 per cent. Meters are now tested biennially, and the loss of water greatly reduced." In this connection Springfield is reminded of the uncertainty as to the bonded past of the water works.

"To secure the original water works, the city in 1867 issued bonds to the amount of $467,000. The original bonds have been retired, but other bonds have been issued, and the bonded debt of the city remained greater when the survey was made than the amount of the original issue for the water works. Whether the old water bonds, or the bonds issued to refund them, have been actually paid off, cannot be ascertained from the records; and for the amount, at least, it is of no particular importance. The important question is as to the extent that the water works have given money to the city to retire bonds and pay the interest upon them, regardless of what the city did with the money."

The Sage Foundation surveyors found that the records of the department and of the city, particularly prior to 1890, were deficient; they were in such condition that it seemed impossible to obtain any accurate information on what part of the present water plant, if any, had been paid for by the taxpayers in other ways than through water revenues. From material available, however, it appeared a safe estimate that at least $500,000 of the cost of water equipment, which included other property, of course, than the original works, had been bought with city money, strictly speaking, and that this amount had not been paid back to the city by the water department—in other words, that about $500,000 of the city debt was due to expenditures for the city's water works system. The value of the property was about $1,000,000. Thus it would appear that the water department had paid out of net receipts from water rates about one-half of the cost of the present equipment, or about $500,000.

Control Sprinkling to Conserve Supply.

Lincoln, Neb.—Alleging that too many of the citizens of Lincoln refused to voluntarily assist the municipal water plant in overcoming the present emergency, the city council has passed an emergency ordinance dividing the city into two districts for the use of water on lawns and gardens. Those living south of K street may sprinkle their lawns and gardens on the even numbered days. Those living north of K street may use water on odd numbered days. Water is to be used for sprinkling purposes only between 5 and 8 p. m. A fine of $100 may be assessed for violation of the ordinance. Mayor Miller gave the police department copies of the ordinance with instructions to arrest the violators. Commissioner Schroeder also furnished the department with a list of those who had recently violated the orders to stop sprinkling in the past few days. Hose, pipe and any other device not equipped with a sprinkler or nozzle are strictly forbidden by the city. Every pipe or hose used for the conveying of water to the lawns must be equipped with a sprinkler or nozzle. There are 12,000 consumers in the city.

Waterworks Fireman Bravely Holds Post.

Philadelphia, Pa.—On one of the recent broiling hot mornings, for an hour and a half 66 per cent of the city's supply of water, furnished by the Torresdale water plant, was dependent upon the sole efforts of a single negro fireman. Four others who formed the regular shift at that time were incapacitated by the abnormal heat and did not appear at the accustomed hour. But the lone volunteer undertook his task at the boilers manfully and fought off exhaustion for the long ninety minutes until substitute firemen could be found to help him. The officials have been agitated at the thought of what would have been the consequence of an outbreak of fire at that time. With a water

pressure of only six pounds to the square inch, the lowest ever recorded in the city, little resistance would have been offered to the rapid progress of a general conflagration. Chief Davis' appeal for more men at the filtration plant was denied by councils shortly before adjournment. In spite of competition with munitions factories, the somewhat remote location of the Torresdale plant and depletions by draft, a higher rate of wages was also refused by that official body. As manned at present, the plant is capable of turning out an average of 280 gallons a day for each person in the district served. Yet even when running at the full, production is overtaxed by reason of wastage. Chief Davis is increasing the vigor of his campaign against water wastage.

STREET LIGHTING AND POWER

Provincial Commission Takes Over Big Plant.

Niagara Falls, Ont.—The Provincial Hydro-electric Commission is now in full control of the Ontario Power company's plant here. The plant was recently purchased by the commission for twenty-two million dollars, thirteen million of which is represented in bonded indebtedness to the company. In acquiring the Ontario Power company, Sir Adam Beck considers that the company, which is the largest and most efficient developing concern on the Canadian side of the Niagara river, will form an important link in the Chippawa Creek-Queenstown Heights developing scheme, the ultimate capacity of which will be 900,000 horsepower, six times more horsepower than is now being sold by the commission's great Niagara system. The Ontario Development company has a franchise development of 180,000 horsepower, which with an additional conduit could be increased to 240,000 horsepower. The commission is spending $15,000,000 on the Chippawa scheme, which will probably absorb the Ontario Power company's system in the course of a few years.

Sweeping Decision for Kansas Natural Gas Company.

Kansas City, Kan.—The U. S. district court at Minneapolis, through judge Wilbur E. Booth, sitting in the Kansas gas case, gave out a sweeping decision favoring the company on several issues. Judge Booth held that the contracts between the Kansas Natural Gas Co., and the distributing companies were not binding upon the receiver. He also decided that the gas furnished the Missouri cities involves interstate commerce, placing the public utilities commission of Missouri upon the same basis with reference to the case as that occupied by the public utilities commission of Kansas. Judge Booth also indicated, although he did not hand down a decree, the rates to be put into effect in all the cities served by the Kansas Natural. Lawrence and Topeka will pay 60 cents per 1,000 cubic feet. The same rate will apply in other Kansas cities, in St. Joseph, Atchison, Leavenworth and all other towns north of Thayer, Kan. Thayer and all towns south of Thayer will pay 50 cents per 1,000 cubic feet. Coffeyville, Independence, Parsons and Elk City, which are supplied from local fields and which are not dependent upon the Kansas Natural Gas, will have an average rate of about 30 cents. The basis of division between the Kansas Natural and the distributing companies will be operating expenses for each plus 50 per cent of the profit. In other words after all expenses of operations are paid the receiver for the Kansas Natural and the distributing companies will split what is left. These rates are based on a probable supply of 20,000,000 cubic feet of gas daily to the consumers of the entire system, the experts in attendance at court figuring that this will do the cooking and lighting for the territory covered by the Kansas Natural. Henry L. Doherty was given permission to take up his pipe line extending from the "Hogshooter" field to Iola, Kan. This pipe will be turned over to the receiver of the Kansas Natural for use in connecting the Blackwell field with the Kansas Natural lines. This shift was made necessary because it is now impossible to buy gas pipe in the market. In return the Kansas Natural is to carry gas to the consumers deprived of gas service by the taking up of the "Hogshooter" Iola line. Mr. Doherty believes that he will be able to increase the output of the Kansas Natural 40,000,000 cubic feet a day by this shift. The development work which Mr. Doherty has done and is doing will cost him about $2,500,000 this year. Judge Booth refused to entertain the plea of the Kansas City Distributing company for a $1 rate. He also refused to entertain the plea of the Topeka Distributing company for a 90-cent rate. He indicated that the plan of a graduated increase in the price of gas from the small consumer to the large consumer is unscientific rate-making. On the other hand he indicated that it is his judgment that the rate should be gradually reduced to the large consumers. The rate will be a temporary one, but it doubtless will hold throughout the winter. Kansas City, Mo., will pay 60 cents for its gas.

City Protests Company's Rates.

Gary, Ind.—Revolt against the rates and tactics of the Gary Heat, Light and Water company, a subsidiary of the United States Steel Corporation, has broken out in the city council. Attacks were made on the company from three sources. People living on lots that were bought in subdivisions not owned by the Gary Land company, the realty and renting department of the steel trust, pleaded for water. Councilmen declared that in certain districts steel workers and their families had to get their water from the horse troughs that saloon keepers have in front of their place, and mayor R. O. Johnson, in a formal message to the council, pointed out existing high rates and asked that the city protest against the general appeal of Indiana utilities companies for higher rates. This the council voted to do. Mayor Johnson compared Gary rates with those of Chicago and of other Indiana cities. He pointed out that since gas, electricity and the power that pumped water from Lake Michigan were produced from by-product gas made at the Gary plant of the Indiana Steel Company, also a steel trust subsidiary, that these things should be cheaper here than elsewhere. The local steel company sells its power to its sister subsidiary, the heat, light and water concern, and, producing these commodities on a vast scale, is supposed to do it at a low rate. Dollar gas in Gary was compared with 70 cent gas in Chicago, and the minimum rate of $1 here was cited in comparison with the lower minimum rates of other Indiana cities. Water, which sells here at 30 cents a thousand gallons, was cited as costing four times as much as does water in Chicago, and the rates for electricity also were assailed. The mayor denounced local rates as exorbitant and pointed out that while the Gary concern had not joined in the general petition for higher light rates it would benefit from them. Figures showing the profits and surplus of the company were cited. The council ordered that petitions be circulated through the city calling for lower local rates. The council for more than two years has locked horns with the utilities company for not extending water service to certain parts of the city. A municipal water works was once ordered built by voters, but the company gave in and a compromise was reached whereby the city guarantees that the steel subsidiary is to have 10 per cent on its investment. John Keseric, councilman, and Harry Sulzbaugh, safety commissioner, declared that citizens in one section either had to use yellow surface water or go as far as a quarter of a mile and carry water from a trough used for horses. R. E. Houren, councilman, pointed out that the water company readily extended its mains and fire plugs to the steel trust's real estate subdivisions long before a single house was built on them.

Win Step in Long Fight Against Poles.

New York, N. Y.—Residents of the thirtieth ward section of Brooklyn have won what they regarded as an important success in their long fight to compel the removal of electric light poles and wires from the streets of that district. supreme court justice Benedict decided that the Edison Electric Illuminating Company should appear in court to defend its use of the streets in the Bay Ridge-Borough Park-Bath Beach section for carrying electricity to private consumers. The alternative writ of mandamus is directed against borough president Pounds of Brooklyn and the commissioner of Water Supply, Gas and Electricity. The question of whether the poles and wires are to remain will be decided at the hearing on the writ, to be held in the fall, The fight for the removal of the poles was started about eight years ago. Corporation counsel Archibald Watson

held that the electric light company had no legal right to the use of the streets, but the company obtained an injunction restraining the city from removing the poles and wires. The matter was sent to a referee, who sustained the opinion of the corporation counsel. It was alleged, however, that despite this the authorities continued to issue permits for the erection of poles and the stringing of wires. In granting the writ, Justice Benedict said the charters of the old city of Brooklyn or the amendments thereto up to the time of consolidation did not give the common council of the former city power to grant franchises for supplying electric light, heat, or power except for public use, such as street and park lighting. "This, however," the court says, "would not confer upon the company the right to furnish light, heat or power to abutting owners for profit." In its answer the company declared that it furnishes light and heat and power to many municipal buildings and plants and to some ten thousand private consumers in the Thirtieth Ward and that it has expended $160,000 above the surface and $740,000 beneath the surface of the streets in that ward, in addition to more than $2,000,000 in the construction of its generating plant. Justice Benedict says that the company's contention of a franchise "by acquiesence" and non-interference with the installation of this vast equipment is unsound, and that no right can be claimed from the fact that the state legislature acted in accordance with a belief that the company had a legal valid franchise. Justice Benedict also expresses regret that the company, in its answering brief, had seen fit to denounce the plaintiff as a "malicious meddler." "The law is no respecter of persons, and it ill becomes the counsel for a public service corporation, drawing its sustenance from the generous breasts of the public, to attack the motives of an antagonist upon the ground that his occupation is lowly. In the eyes of some persons the relator's occupation (painter and paperhanger) might be regarded as quite as honest as that of the defendant corporation." Consideration of the allegations in the petition and the answers interposed by the Edison company and the city official prompted Justice Benedict to deny the request for a peremptory writ, which would compel the officials to begin at once the ripping out of the company's poles and other equipment which are on or under the public streets. He granted, however, an alternative writ, which compels the company to come into court.

FIRE AND POLICE

Police Strike Wins Higher Pay.

South Bethlehem, Pa.—After a few hours' strike the policemen of the city won from the borough council an increase in pay of $11 per month. Under the new schedule the chief will receive $102 per month, sergeants $96 and patrolmen $90. Chief Daniel Gallagher was away on his vacation. When chairman Hartjan of the council market committee reported that the market receipts were $1,000 in excess of the estimate passed on last year, $935 was transferred to the police fund to pay for the increase during the rest of the year.

Chicago Aldermen Study Saloon Problems.

Chicago, Ill.—Members of the city council committees on licenses and on schools, fire, police and civil service have left for the east to study police and saloon conditions in New York, Boston and other cities. The committee on licenses, of which alderman John Toman is chairman, proceeded direct to Boston. The other committee, under alderman Franz, left the Toman party at Buffalo and are visiting Canadian cities to study police methods and stations. The Toman party includes aldermen Toman, Anderson, Fetzer, Woodhull, Krumlick, Novak, Horne, Smith, Bowler, Ellison, Roeder, Byrne, O'Toole, Long, Clark and William F. Harragh, sergeant at arms of the city council; the Rev. John P. Brushingham, secretary of the morals commission; George F. Lohman, deputy city collector; James W. Breen, assistant corporation counsel, and Frederick Rex, municipal reference librarian. Eleven subjects bearing on the investigation with a total of 127 questions will be used by the Chicago "questionnaire" commission. The subjects are: "The Saloon in Relation to Municipal Revenue." "The Saloon in Relation to Public Morals." "The Saloon in Relation to Public Amusements." "The Saloon in Relation to Public Regulation and Control." "The Granting and Revocation of Saloon Licenses." "The Saloon in Relation to Business, Industrial, and Residential Districts." "The Saloon in Relation to the Dependent, Defective, and Delinquent Classes and to Gambling." "The Saloon in Relation to the Treating Habit." "The Saloon in Relation to Breweries, Wholesale and Producing Interests." "The Saloon in Relation to Law Enforcement and Pernicious Political Activity." "The Saloon in Relation to Proposed Measures of Constructive Reform and Improvement." Three thousand dollars was granted the two committees for expenditures on the investigation.

Increased Pay for Police and Firemen.

Indianapolis, Ind.—An ordinance providing for an increase in pay of about 20 per cent for all city firemen has been passed by the city council over the veto of mayor Bell. The ordinance will become effective January 1. Another ordinance that would give members of the police department an increase in pay of about 20 per cent has been introduced by Thomas C. Lee, and it is believed that it will be passed. The police measure also would become effective January 1. It is estimated that the increases in pay provided for the firemen will amount to about $80,000 a year, and that the proposed increases for the police would amount to about $110,000 annually. The police ordinance would leave the salary of the superintendent of police at $4,000 a year. This salary is fixed by state law and cannot be changed. The proposed salary increases follow: Inspector of police, from $2,100 to $2,800 a year; police captains, from $1,740 to $2,000 a year; lieutenants, from $1,500 to $1,700 a year; sergeants, from $1,320 to $1,500 a year; bicyclemen, turnkeys, traffiemen and mounted men, from $3.50 to $3.75 a day, and patrolmen, from $3 to $3.50 a day.

Firemen Win Pay Increase by Strike.

Walla Walla, Wash.—After endeavoring to secure a new force to take the place of the firemen, including the chief of the department, who struck for $15 a month salary increase, mayor Mike Toner, head of the police and fire departments, granted the demands of the men. When the firemen walked out, the mayor announced he would fill their places, but being unable to do so called a meeting of the city commission, where a decision to grant the demands was reached. For more than an hour the city was without fire protection and fire underwriters kept the city officials busy with complaints and warnings. Formal application for an increase in salary was made by the firemen several months ago, when petitions which had been circulated among the business men of the city were filed. Practically all lines of business were represented on the petitions, but the commissioners had taken no action, and the firemen finally agreed upon a different course of action. In behalf of their demand for an increase, the firemen cite the increase in the cost of living, and point out the difficulty that has been experienced since the first of the year in keeping men in the department. It is said there have been more changes in the personnel of the companies in the past eight months than for several years, due to low salaries paid new men, and the efficiency of the fire-fighters has been maintained only with a maximum amount of effort. "When it is considered that we put in 24 hours a day for the city and are allowed but an hour off for meals, even then being subject to call," said a representative of the firemen, "the request for an increase cannot be regarded as unjust." There has been no increase in pay of the firemen, they claim, since July, 1908.

GOVERNMENT AND FINANCE

Special Election on $18,000,000 Improvements.

St. Louis, Mo.—A special election, to be held November 6, on bond issues aggregating $18,840,000, has been approved of the board of aldermen and the mayor. The bond issue

will include the following items, each of which will be adopted if it receives two thirds of the votes cast at the election. Proposition 1—$9,915,000 for the improvement of River des Peres by widening and deepening it to carry off the foul and storm water; the construction of a connecting railroad, a driveway and viaducts. Proposition 2—$2,825,000 for the construction and reconstruction of public sewers. Proposition 3—$2,100,000 for the acquisition of public parks and playgrounds, the erection of shelter buildings, public comfort stations and park buildings and roads. Proposition 4—$2,000,000 for the construction of a municipal convention hall. Proposition 5—Three hundred and sixty thousand dollars for a municipal farm. Proposition 6—One hundred and fifty thousand dollars for the improvement of Koch hospital. Proposition 7—One million dollars for a southern approach to the free bridge. Proposition 8—Five hundred thousand dollars for bridges and viaducts. The aldermen provided by amendments that the River des Peres fund might be used also for the establishment of industrial districts, and that the municipal farm might be used as a place of detention for anyone convicted of a misdemeanor. The election will cost taxpayers about $70,000, and if all the bonds are voted it will exhaust the present limit of the city's bonded indebtedness. Action by the council followed requests by many civic and business organizations which had approved the plans of the City Plan Commission. Harland Bartholomew, engineer for the City Plan Commission, explained that the $9,000,000, approximately, which would be devoted to the improvement of River des Peres, and the construction of a boulevard and railway along its banks, would have to be spent by the city in all likelihood, even if a long delay were decided on in an effort to get St. Louis county to pay its share of such improvements. Bartholomew explained that if the entire river were included in a drainage district, St. Louis would have to pay four-fifths of the cost of improvements, and it would equal the amount which it is proposed to expend. If the city issues bonds and improves the river now, it will not have to stand any part of the expense of future improvements in the county.

Many Employees Dropped.

Oakland, Cal.—As a result of the investigations and on the recommendation of the Civil Service Board, initial action on the wholesale abolition of "superfluous positions" in the departments of streets and public works and consolidation of others has been started by the city council. The recommendations of the Civil Service Board call for the immediate ousting of about thirty-three employees with a yearly saving to the city of about $44,322. This action was taken as a result of the economy movement inaugurated by mayor John L. Davie when he assumed office.

Lighting, Fire and Police Cut After Revenue Loss.

Springfield, Ill.—Every fire station in the city with the exception of those in the downtown district was closed, street lights are turned off at midnight, the city police department has been materially reduced, city hall employees work by the day instead of by the month, gas and meter inspectors will be eliminated and there will be other material reductions in the service and force of employees working for the city as the result of the recent election. The overwhelming defeat of the proposed corporate tax increase, depriving the city of some $124,000 revenue city commissioners had hoped to raise to partially make up the deficit in funds for operating expenses of the corporate government caused by the loss of an income of $145,000 during the present year, make all of these things necessary, according to members of the city council. The statement prepared for publication, and signed by the entire city commission, was as follows. "By their vote the people of Springfield decreed that their city should exist on an income about one-half sufficient to meet the cost of the services the city now renders. The city commissioners have no choice other than to accept the verdict rendered and reduce departments to approximately one-half their present effectiveness. This remains the only choice available because the city, by the result of the election, is deprived of credit. It therefore has no means of securing money with which to meet its ordinary operating expenses for the balance of the present fiscal year, which expires February 28, next. A favorable vote would have given the city $124,000 of the $145,000 loss which the city has sustained in its revenues in the past year through causes well known to the public." Seven department heads and three city employees were the first to feel the "guillotine," when city commissioners agreed to dismiss them at once and eliminate an annual expense of $11,560 from the city payroll. Dr. O. H. Deichmann, superintendent of health, under commissioner Reece, was one of the officials to lose his position. His annual salary was $1,200. Electrical inspector James D. Valentine, in the same department, was dismissed and his $1,350 salary cut off the payroll. Meat inspector John Breustle and infant welfare nurse Mary F. Wilson, also in commissioner Reece's department, were discharged. Those in commissioner Hamilton's department to lose their jobs were sewer inspector John Requarth and sidewalk inspector William Gaessler. In mayor Baumann's department, gas and meter inspector Charles H. Lanphier and assistant, Joseph Kleisner, with a total salary of $2,190, lost their offices. Lanphier has agreed to give his services free to the city as gas and meter inspector.

Cities Fight Anti-Municipal Ownership Bill.

Atlanta, Ga.—Cities throughout the state are up in arms to defeat again state legislation intended to cut off all possibilities of future erection of municipal utility plants. Mayor John C. Cook, of Columbus, has enlisted the aid of the city officials and civic and commercial bodies of other cities and all efforts are being used to oppose the bill. It has already been reported on favorably to the judiciary committee No. 2 of the house of representatives. It would prohibit the erection, in any municipality, of municipally-owned public utility plants where plants are being operated by private capital, unless the permission of the Georgia railroad commission is first secured. A similar bill was introduced and passed in the senate during the session of 1916, and was only defeated in the house by the combined opposition of the various municipalities of the state of Georgia. At the present session, the various power, street railroad, electric and gas lighting companies, and other public utilities, are strenuously working through several lobbyists to bring about the passage of this bill. Resolutions passed by the council of Savannah say that the bill would deprive "cities and other public corporations of rights they now enjoy and permanently insure monopoly in the matter of public utilities." They charge that the bill "is solely for the interests of privately owned public service corporations and that it seeks to perpetually establish monopoly and to hamper to the point of destruction the right heretofore enjoyed by all municipalities of encouraging competition or establishing and operating plants of their own for the protection and promotion of the public interest. If the bill is enacted, if there is anywhere in the district so much as a line for the distribution of electrical current, the burden and expense is placed upon a municipality desiring to operate its own plant of procuring the approval of the Railroad Commission of the construction, maintenance and operation thereof, and, in addition, the judicial determination by this commission that such a plant is absolutely required. The power to operate public utilities is a valuable protective right which should be exercised by the municipality for the good of the people, and should not be destroyed in the interest of monopoly."

Forty-Four Per Cent of Engineer Corps Dismissed.

Portland, Ore.—Plans for the complete reorganization of the engineering corps of the department of public works, involving the dropping from the pay rolls of 55 employes or 44.2 per cent of the entire city engineering corps, have been announced by commissioner Barbur. In the list of those whose services were dispensed with August 1 are heads of bureaus, engineers, instrumentmen, draughtsmen, computers, clerks, stenographers and inspectors. The dismissals are expected to result in a net saving in pay rolls of $64,500 annually. In issuing his orders commissioner Barbur announces that while he has made no changes for the present in the office of the chief clerk and the building in-

spection bureau, he plans their reorganization in the near future. City engineer Laurgaard, on whose recommendations the changes are made, is of the opinion that the building inspection bureau should be either directly in charge of the city engineer or transferred to the department of public safety. He also favors transferring much of the clerical work of the department to the city auditor's office. Civil service rules have been observed in the reorganization. Each of the employes will be informed that his or her services no longer are needed and that his or her name will be placed on the civil service eligible lists from which the original appointment was made. The rule is that the last appointed to any position in a classification shall be the first to be laid off in case of a reduction in the force. The shakeup completely breaks up the big organization of former commissioner Dieck. Many of the employes dismissed have been in the service eight and ten years. "For the present we are attempting little new construction work, and the big force of employes is not needed," said commissioner Barbur. Among those hit by the shakeup are W. P. Hardesty, chief of the bureau of surveys and draughting; J. C. Sharp, chief of the bureau of sewers; C. H. Smith, sewer engineer. J. R. Hanson will remain assistant city engineer; R. E. Kremers, chief of the bureau of highways and bridges; Charles H. Wanzer will be made chief of the bureau of streets, a new bureau which will be created; R. G. McMullen will be chief of the bureau of sewers, and Jesse Hannam will be chief of the bureau of surveys and draughting.

MISCELLANEOUS

Enforcing New Billboard Law.

Hartford, Conn.—The state police department, following notice, is enforcing rigidly the new law relating to billboard licenses and restrictions. Applications for licenses had to be filed by Aug. 1. The license fee is one-half cent per square foot per annum, the space to be computed by measurements to the outer edge of all frames, billboards, etc. The only exemptions are: (1) Signs containing less than four square feet. (2.) Signs on the property upon which the goods advertised are manufactured or offered for sale, or upon which the business advertised is carried on, wholly or in part. (3.) The advertisement by any town, city or borough of its industries. A separate application and license is necessary for each and every advertisement or space structure so used or offered for rent. No license will be issued for any sign that obstructs the view from the highway of steam or electric tracks within 300 feet of any grade crossing. Some of the features of the law follow:

The application for such licenses state: (1) The location of the property upon which it is proposed to display such advertisement; (2) the population of the city, borough or town within which the same is to be displayed; (3) the distance of the location of such advertisement from any crossing at grade of a public highway and the tracks of a steam railroad or electric railway, if such distance be less than three hundred feet; (4) the size and a general description of such advertisement.

Sec. 2.—The fee for such license shall include all of the space within a line drawn around the outer edge of such advertisement, or if such advertisement is upon, attached to or a part of any billboard, frame, network, transparency, or other form of construction, such line shall be the outer edge of such construction and each surface or space displaying any name, word, symbol, character, picture or letter shall be construed to be an advertisement. Upon the receipt of such application and fee, the superintendent of state police shall issue a license for each such advertisement, which license shall permit the holder thereof to display such advertisement for one year from the date thereof, and each such advertisement shall include the number of such license and date of expiration.

Sec. 3.—The superintendent or state police may issue to any person owning or leasing any space for advertising purposes, a license authorizing the use of such space for such purpose, upon payment by such person of a fee determined as herein provided. Such space shall plainly show the number of such license and the date of expiration. Any advertisement placed upon any such surface shall be exempt from the payment of any license fee during the period for which such space is so licensed

Sec. 4.—The licensing and inspection of billboards, and all advertisements displayed thereon, the issuing of the license herein provided for and the enforcement of the provisions of this chapter shall be under the control of the state police department.

Sec. 5.—No owner or lessee of real estate or any interest therein shall lease or license any part of such real estate in this state to any person, for the display of advertising matter until such proposed lessee shall have obtained a license in accordance with the provisions of this act.

Sec. 6.—No license shall be required under the provisions of this act from any town, city or borough for any advertisement owned by it and advertising its industries and maintained at either public or private expense.

Sec. 7.—Any person or the managing agent of any firm or corporation violating any provision of this act shall be fined not more than thirty dollars or imprisoned not more than thirty days. Each month that any advertisement is displayed in violation of any provision of this act shall constitute a separate offense.

Begin on Harrisburg Capitol Improvements.

Harrisburg, Pa.—Governor Brumbaugh recently approved the bill appropriating $350,000 for the preliminary improvements to the Capitol Park extension area—grading and filling—and gave orders that the tract be cleared by August 15. There were still, when the order was given, many persons living in the zone, by permission of the commonwealth which has taken over their buildings, two synagogues were still in use, two engine houses were occupied and a dozen buildings were used for state departmental purposes and armory purposes. At the same time it was announced that nine of the properties in litigation had been added to the eighteen buildings that were put up at public auction. Superintendent George A. Shreiner of the department of public grounds and buildings, at once began work and conferences were arranged with Arnold W. Brunner, the New York architect, and Warren H. Manning, the Boston landscape architect, both experts in the state's employ, regarding the matter. The city's part in this program will be to find other places for the fire apparatus of the Citizen engine company and the Mt. Vernon Truck company. The state has a bigger problem facing it. There are about a dozen of the buildings in the zone used for state departmental purposes. These must be moved to offices and places where rent must be paid. Among the state departments affected are the State Live Stock Sanitary Board of the Agricultural department, the bureau of chemistry, of the same department; the state highway department garage; the adjutant general's department storage building; the bureau of engineering, public service commission; the division of distribution of documents of the Department of Public Printing and Binding; the employment bureau of the Labor and Industry department.

Ocean Terminals Built by U. S.

Washington, D. C.—Finding that existing ocean terminals are entirely inadequate for the coming demands of shipping the Council of National Defense has created an advisory commission on terminal facilities, to cooperate with the general munitions board and with the sub-committee of the board on storage facilities. The committee is investigating the ocean terminals of the country for the use of war-supply vessels. It is practically certain that new terminals are to be built especially for handling army supplies. Exports will greatly increase in volume as soon as the ships to be produced by the Emergency Fleet Corporation and the Shipping Board are provided, and the advisory commission on terminal facilities will make a study of this subject as well as the physical engineering features connected with the present terminals and the probable needs of the future. Unnecessary freight hauls will be eliminated it is expected, releasing cars and locomotives for inland transportation. Frances Lee Stewart, consulting engineer, formerly chief engineer of the Baltimore & Ohio R. R., representing the port of Baltimore, will be the chairman. Representatives for New Orleans and Boston have not yet been selected. Others so far named to serve on the new organization are as follows: B. F. Cresson, consulting engineer, 50 Church St., New York, designated by the State of New Jersey to represent the New Jersey sections of the ports of New York and Philadelphia; R. A. C. Smith and Charles W. Staniford, respectively commissioner and chief engineer of the Department of Docks and Ferries of New York City, designated by the mayor of New York to represent New York's waterfront and the port of New York; J. B. Locke, secretary of the Newport News Chamber of Commerce, designated by the Virginia Corporation Commission and the mayor of Newport News; and W. A. Cox, secretary and traffic manager of the Norfolk Chamber of Commerce, designated by the Virginia Corporation Commission and the mayor of Norfolk.

NEWS OF THE SOCIETIES

Calendar of Meetings.

Aug. 15-17.—LEAGUE OF WISCONSIN MUNICIPALITIES. Annual convention, Racine, Wis. Secretary, Ford H. Macgregor, Madison, Wis.

Aug. 21-23.—NEW YORK STATE FIREMEN'S CONVENTION, Flushing, N. Y. Secretary, Thos. Honohan, Frankfort, N. Y.

Aug. 22.—UNION OF NEW BRUNSWICK MUNICIPALITIES. Annual convention, St. John, N. B. Secretary, James King Kelley, St. John.

Aug. 27-29.—UNION OF CANADIAN MUNICIPALITIES. Annual convention, London, Ont. Secretary, W. D. Lighthall, K. C., Westmount, Que.

Aug. 29-31.—UNION OF NOVA SCOTIA MUNICIPALITIES. Annual convention, Truro, N. S. Secretary, Arthur Roberts, Bridgewater, N. S.

Aug. 29-31.—ONTARIO MUNICIPAL ASSOCIATION. Annual convention, Toronto, Ont. Secretary, B. H. Spence, 705 Lumsden building, Toronto, Ont.

Sept. 10-15.—NATIONAL EXPOSITION OF SAFETY AND SANITATION. Annual conference, New York, N. Y. Secretary, W. C. Cameron, Continental and Commercial Bank building, Chicago, Ill.

Sept. 11-13.—AMERICAN ASSOCIATION OF PARK SUPERINTENDENTS. Annual convention, St. Louis, Mo. Secretary, Roland W. Cotterill, 533 City Hall, Seattle, Wash.

Sept. 11-14.—INTERNATIONAL ASSOCIATION OF MUNICIPAL ELECTRICIANS. Annual convention, Niagara Falls, N. Y. Secretary, Clarence R. George, Houston, Tex.

Sept. 11-14.—NEW ENGLAND WATERWORKS ASSOCIATION. Annual convention, Hartford, Conn. Secretary, Willard Kent, 715 Tremont Temple, Boston, Mass.

Sept. 18-20.—LEAGUE OF IOWA MUNICIPALITIES. Annual convention, Iowa City. Secretary, Frank G. Pierce, Marshalltown, Ia.

Sept. 18-20.—LEAGUE OF VIRGINIA MUNICIPALITIES. Annual convention, Lynchburg, Va. Secretary, L. C. Brinton, Portsmouth, Va.

Sept. 24-29.—LEAGUE OF CALIFORNIA MUNICIPALITIES. Annual convention, Santa Rosa, Cal. Secretary, Wm. J. Locke, Pacific Building, San Francisco, Cal.

Sept. 25-27.—SMOKE PREVENTION ASSOCIATION. Annual convention, Columbus, O. Secretary, Frank A. Chambers, City Hall, Chicago, Ill.

Sept. 27-29.—AMERICAN AND CANADIAN ENGINEERS AND ARCHITECTS OF NORWEGIAN BIRTH OR DESCENT. Informal congress and re-union, Chicago Norske Klub, Chicago, Ill. Chairman, Committee on Arrangements, Joachim G. Giaver, consulting engineer, Chicago, Ill.

Oct. 9-12.—LEAGUE OF KANSAS MUNICIPALITIES. Annual convention, Wichita, Kan. Secretary, C. H. Talbot, University of Kansas, Lawrence, Kan.

Oct. 15-17.—NATIONAL HOUSING ASSOCIATION. Annual conference, Hotel La Salle, Chicago, Ill. Secretary, Lawrence Veiller, 105 East 22d St., New York City.

Oct. 17-18.—LEAGUE OF MINNESOTA MUNICIPALITIES. Fifth annual convention, St. Cloud, Minn. Secretary-treasurer, Richard R. Price, University of Minnesota, Minneapolis.

Oct. 22-24.—AMERICAN CIVIC ASSOCIATION. Annual meeting, St. Louis, Mo. Secretary, Richard B. Watrous, 914 Union Trust building, Washington, D. C.

Nov. 19-24.—CITY MANAGERS' ASSOCIATION. Annual meeting, Detroit, Mich. Secretary, W. L. Miller, City Manager, St. Augustine, Fla.

Nov. 20-23.—PLAYGROUND AND RECREATION ASSOCIATION OF AMERICA. Recreation Congress, Milwaukee, Wis. Secretary, H. S. Braucher, 1 Madison Ave., New York, N. Y.

Nov. 21-24.—NATIONAL MUNICIPAL LEAGUE. Twenty-third annual meeting, Hotel Statler, Detroit, Mich. Secretary, Clinton Rogers Woodruff, 703 North American Bldg., Philadelphia, Pa.

Conference of Regulating Boards.

A call has been sent to the members of all public service, utility and railroad commissions in the United States for the twenty-ninth annual convention of the National Association of Railway Commissioners to be held in Washington October 16. Active co-operation of the association "in the matter of federal control over operation of railroads to meet military and industrial requirements" will be among the subjects to be discussed. There are regulating committees in forty-seven of the forty-eight states of the union, Delaware being the sole exception.

National Association of Purchasing Agents.

The annual congress of purchasing agents under the auspices of the National Association of Purchasing Agents will be held at Pittsburgh, Oct. 9, 10 and 11. The program includes business sessions for the mornings and visits to and inspection of industrial works during the afternoons.

New York State Firemen's Association.

The committee in charge of the State Firemen's Association convention, which will be held this year in Flushing, the latter part of August, have plans under way for making the affair one of the largest events ever held in Flushing.

The parade and tournament on the last day, August 24, will be the feature. Three prizes will be awarded in each event in the tournament. The events will be an efficiency contest, hook and ladder contest, ladder climbing contest, dry hose contest, horse hose contest, motor hose contest, motor hook and ladder contest, wet hose contest and many others. These events will be held on Broadway, opposite the Flushing Town Hall. The events have attracted fire companies from all parts of the State.

City Clerks' Association of New York.

The City Clerks' Association of the State of New York is holding its 10th annual convention at Glens Falls (Aug. 16, 17 and 18). Albert L. MacMaster, city clerk of Rome, is the secretary and treasurer of the organization. The headquarters of the association are at Hotel Ruliff. The sessions of the convention are being held in the city hall, and the program being carried out is as follows:

Thursday, Aug. 16, 2 p. m., opening session—Address of welcome, Hon. Edward Reed, mayor of Glens Falls; response and opening remarks, Joseph S. Hanlon, president, city clerk, Auburn; "The City of Glens Falls," B. F. McCreery, president chamber of commerce; "The City Clerk," Earl E. Hall, city clerk, Glens Falls; reading communications, minutes of previous session and reports; topic, "Has the War Situation Produced Legislation Which Actually Increases Home Rule?" Discussion opened by David E. Pugh, city clerk of Albany. Topic, "The Amended Laws Governing Hunting Licenses." Discussion opened by Mose W. Simson, city clerk of Tonawanda. 7.30 p. m.—Theater party, Empire theater.

Friday, August 17, 9 a. m.—Auto trip around city, visiting various points of interest. 1.30 p. m.—Special car to Lake George, then taking boat through the lake to Paradise Bay, returning to Glens Falls about 6 p. m. 8 p. m.—Topic, "Agricultural Law, Relative to Dogs." Discussion opened by Peter Collins, city clerk of Mount Vernon. Topic, "How City Clerks of First and Second Class Cities Are Aiding the Government During the War Crisis." Discussion opened by Daniel J. Sweeney, city clerk of Buffalo. Topic, "How City Clerks of Third Class Cities Are Aiding the Government During the War Crisis." Discussion opened by Grover C. Yerdon, city clerk of Johnstown. Presentation of resolutions.

Saturday, August 18, 10 a. m.—Topic, "Marriage License Law." Discussion opened by C. Milton Allen, Jr., city clerk of Fulton. Topic, "Municipal Ac-

(Continued on page 168.)

PERSONALS

Duffy, Frank J., former deputy fire chief of New York city, died August 3 at his home in Brooklyn.

Dunnen, Henry, has resigned as city engineer of Jackson, Ky. William Smith has succeeded him.

Longley, F. F., a member of the firm of Hazen and Whipple, has been made a major and sent to France to assume complete charge of the water supply for the American forces.

Middleton, G. M., has resigned as road engineer for Shelby county, Ky., to take effect Nov. 1.

Mulock, M. B., has been appointed superintendent of the Joliet, Ill., water department, succeeding John W. Graham, who has resigned.

Scott, Winfield, mayor of Enid, Okla., formerly a major in the First Oklahoma Infantry, is in the officers' reserve training camp at Fort Root.

Sherman, LeRoy K., formerly a member of the Illinois State River and Lake Commission, has opened offices as consulting engineer at 137 So. La Salle street, Chicago.

Taylor, Dr. W. B. R., has been appointed member of the park board of Schenectady, N. Y.

Wells, George, has been appointed chief highway engineer of Pike county, Ky.

Wood, A. B., engineer for the New Orleans Water and Sewerage Commission, has been retained as consulting engineer by the sanitary district of Chicago.

NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

TRACTOR-TRUCK.

Lapeer Equipment for All Types of Hauling.

The claim for superior efficiency and economy of the Lapeer tractor-truck is based on the advantages of pulling a load rather than carrying it. The tractor-truck consists of two separate units—the tractor which hauls and the trailer which carries the load. It is claimed that transportation costs are reduced to one-half of the usual costs of motor hauling. With one trailer, the 5-ton Lapeer tractor-truck has an average weight of 3,500 pounds, as against 10,000 pounds, the average weight of a 5-ton motor truck. The use of tractors also reduces idle time in loading, an important factor in the economy of operation. The same size tractor is used to carry any size load, only the size of the trailer being changed. This makes the use of the tractor very convenient when different types and weights of load are handled. All kinds of trailers may be used: dump bodies, for sand, cement or other construction materials; stake bodies for pipe, lumber, etc.; underslung bodies for heavy, bulky loads such as machinery, etc.

The tractor-truck can be handled very easily in traffic. It can be turned around in its own length, can turn sharp corners in crowded streets or can be backed against a curb with the tractor at right angles, taking up very little room. Attention and maintenance and repair expenses are much reduced because road shocks and stresses due to the load are absorbed principally by the trailer.

The trailer can be attached or detached in a minute, without the aid of an extra man. The front of the trailer is fitted with rollers that run over an inclined track on the tractor. The trailer also has a standard which drops down and keeps the body level when detached from the tractor. In coupling, the tractor is backed to the trailer, the rollers meet the inclined track and the tractor is then backed under the trailer until the coupling hits the stop. One pin is then inserted and the coupling is completed. The equipment is fitted both with a turn-table and a draw-bar attachment, so that either two or four-wheeled trailers may be used. Ordinary wagons may be satisfactorily used as trailers. Both the draw-bar and turn-table connections

"MODERN" METER BOX TOP.

are through coil-springs that take up the stress and strain when starting or stopping.

The tractor has a very comfortable cab, which affords entire protection to the driver. It has a ventilating, rain vision wind-shield. The windows may be lowered into the doors, and those at the sides may be lowered into the body, making driving perfectly cool and comfortable in summer. The doors may be removed in a few moments.

The motor is a Waukesha, 4 cylinder, 3½ x 5½ stroke; separate head; three-point suspension; cylinders cast en bloc. There are three main bearings. The governor is built in. Lubrication is by pump and splash. Cooling is by centrifugal pump, radiator and fan. The ignition is high tension magneto, fixed spark.

The clutch is multiple disc, dry plate. The transmission is selective sliding, three speeds forward and one reverse. The steering is left hand side, irreversible type—gas control on wheel—accelerator pedal on foot board. The brakes are on rear wheels—service, contracting; emergency, expanding.

The frame is of 5-inch channel steel The rear axle is Torbensen internal gear. The weight is carried on I-beam dead axle. There are roller bearings throughout and all gears and bearings are fully enclosed and run in oil. The front axle is I-beam, drop forged, roller bearings throughout. The wheels are wood, front 34 x 4 inches in both sizes and rears, 34 x 5 inches in 2-3 ton size and 34 x 6 in 3½-5 ton size. The weight is 3,050 pounds. The wheel base is 90 inches.

There are four sizes of the tractor-trucks, 2, 3, 3½ and 5 tons. The accompanying ilustrations show the tractor and views of the turntable coupling and the rear of the tractor (showing track). The equipment is made by the Lapeer Tractor-Truck Company, Lapeer, Mich.

METER BOX TOP.

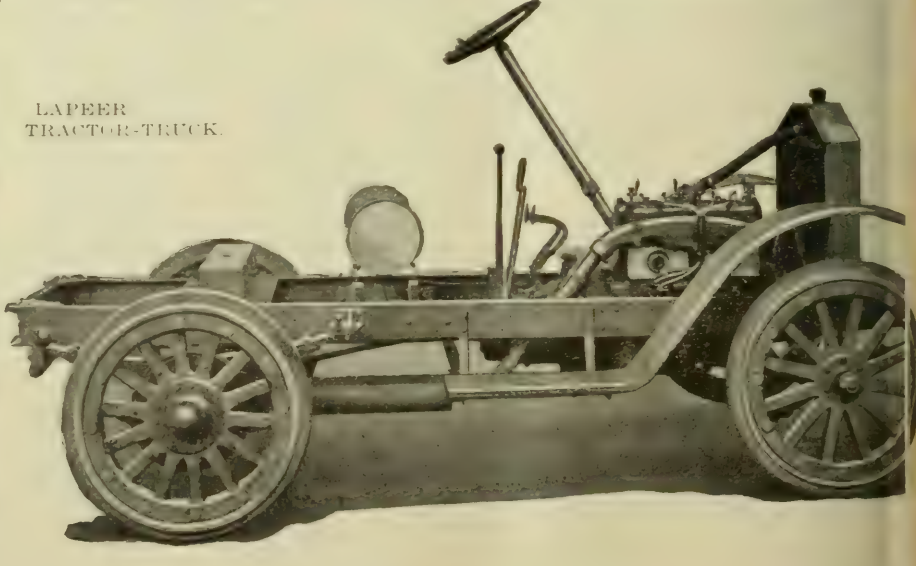
"Modern" Housing Cover With Valuable Features.

The "Modern" meter box or housing top has a number of new features claimed to make it automatic, quick-opening and trouble-proof. The two outstanding points in construction are the rectangular throat and the locking device, both of which should be appreciated by the meter setter, particularly if he has experienced the usual difficulties.

The roomy, rectangular throat elimi-

Rear of Lapeer Tractor.

LAPEER TRACTOR-TRUCK.



ates the inconveniences encountered the use of tops with small round penings. It is easier to fit brick to e square faces of the throat; the job oks neater when it is finished; and cause brick does not have to be oken, the work will be more permanent and require less repairing. The inforcing rib around the outer edge the top adds much strength without increasing the weight—in fact, it lows the use of a lighter casting, relting in a saving in first cost, freight, c. In order to make the top universal in meeting all the usual requirements, it is furnished either with or ithout an inner lid.

The locking device is designed practically to eliminate any possibility of ing stolen, and it cannot be lost in ipment, use or otherwise. The top rt, that which is engaged by the rench, is galvanized malleable iron. he bottom of the locking part, which mes in contact with the iron casting, bronze. This makes the lock resistent to tendencies to rust, corrode stick. To unlock, the key is given half-turn and the cover is raised alost half an inch and stays there. This a particularly useful feature in reading meters after a sleet or rain storm freezing weather. No hammer, rew driver, pick or shovel is necesry for opening this housing top. It practically self-opening and it stays en until it is relocked.

The size of the cover is standardized d is made to fit a tile measuring 18 ches in diameter inside. The accomanying illustration shows the top, hich is made by the Modern Iron Vorks, Quincy, Ill.

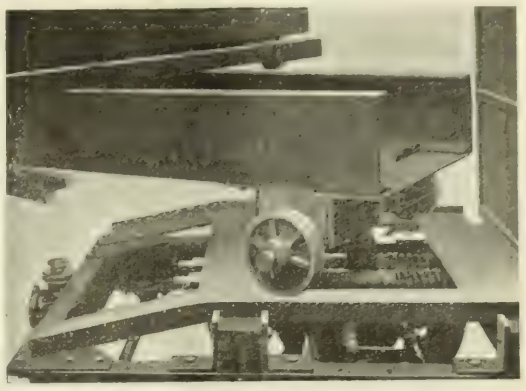
NDUSTRIAL NEWS

Cast Iron Pipe.—Prices continue at e record high levels of the last few eeks. While private buying continues o some extent, only a few cities are aking the best of the situation and uying for urgent needs. The pipe emands of the army cantonments are bout filled. Quotations: Chicago—4-ch, class B and heavier, $68.50; 6-inch, 65.50. New York—4-inch, class B and eavier, $68.50; 6-inch, $65.50. Birmngham—4-inch, class B and heavier, 63; 6-inch, $60; class A, $1 extra.

The Walter A. Zelnicker Supply Co., t. Louis, Mo., has just published a new ulletin, No. 221. This lists exceptional fferings in rails, locomotives, cars, anes, pipe, piling and tanks. Copies f the bulletin are free for the asking.

tandardized Truck Building for U. S. The committee on automotive transort of the Council of National Dense has announced that, as an outome of a conference of motor-truck anufacturers, engineers, representaives of the Quartermaster Corps of the rmy and the committee held at Coumbus, Ohio, the results of which have ince been approved by the War Deartment, the truck makers of the counry have agreed voluntarily to co-oprate with the War Department in carrying through a continuing standardized truck-building program for the requirements of the American Army. The Columbus meeting was attended by fully 2,000 representatives of the industry, and its action, acording to the committee, insures the organized assistance of the country's truck makers in providing an ample supply of military trucks for Government service.

For immediate service in France, the Government either already has ordered or will place orders in the near future for enough trucks of modified commercial type to take care of the first expeditionary forces. Even after the standardized truck is approved, such orders will be continued, so that the fullest possible use will be made of trucks of types now in the service of the Allies, which some American firms are now building.



LAPEER TRACTOR-TRUCK.

Connection Between Tractor and Trailer, Showing Turntable Coupling.

(Note track and wheels for easy coupling.)

In the meantime the Secretary of War has set aside from the contingent fund a sum sufficient to complete the work of standardizing parts for a military truck, based on the best American and foreign experience, which will serve in the future as the standard American Army truck. Much of this work already has been carried out voluntarily by the members of the Society of Automotive Engineers, co-operating with the officials of the Quartermaster Corps. It is hoped that under the new authorization of the War Department the entire work of designing and testing will be completed before January 1 and that construction of the new standardized trucks can then begin.

The experts of the Quartermaster Corps, together with their civilian advisers, have reached the conclusion that it is only by a thorough standardization program, by which manufacturers of parts can all be turned to making the same interchangeable designs, that the Army can be assured of ample supplies for possible greater demands on the capacity of the industry in the future. It is pointed out that not only will the demand for trucks grow as more American troops go abroad, but that, if future allied offensives should drive the fighting more into the open, more rapid and extensive supply transport facilities will be needed. The standardized truck whose design is finally to be completed under the department's authorization will be entirely suitable for commercial purposes, as well as being the best military truck yet designed.

The Hydraulic Pressed Steel Co., Cleveland, O., announces with extreme regret the death of Otto P. Stehn, general sales manager. He was about forty years of age and had been connected with the Hydraulic Pressed Steel Co. for six years.

The Atlantic Refining Company, 3144 Passyunk avenue, Philadelphia, Pa., is publishing a very unusual series of advertisements in a magazine of general circulation, the purpose of which is to acquaint the nation with the resources, industries and points of touring interest in the Keystone state. All organizations in the state have been asked to co-operate to make the visitor welcome. An excellently prepared and illustrated booklet, entitled "Motoring Through the Keystone State," is sent to all requesting it. The Atlantic Refining Company is being congratulated on all sides on the fine spirit displayed in its broad-gauge advertising campaign.

The American-LaFrance Fire Engine Company, Elmira, N. Y., announces the receipt of the following orders: Albia, Iowa, Type 40 combination with junior pump; Atlantic Highlands, N. J., Type 40 combination with junior pump; Boyne City, Mich., Type 40 combination with junior pump; Cicero, Ill., Type 40 combination with junior pump; Cleveland, Ohio, Type 12 pumping engine; Cleveland, Ohio, Type 31 65 ft. aerial truck; Corvallis, Ore., Type 12 pumping engine; Greenwich, Conn., Type 75 pumping engine; Highland Park, Ill., Type 17 75 ft. aerial truck; Louisville, Ky., 2 Type 10 combination chemical engine and hose car; Louisville, Ky., Type 31 65 ft. aerial truck; Marion, Ind., Type 75 pumping engine; Montclair, N. J., 2 Type 40 combination chemical engine and hose car; Norwalk, Conn., Type 14 service truck; Peekskill, N. Y., Type 75 pumping engine; Richmond, Ky., Type 40 combination with Junior pump; Rock Island, Ill., Type 12 pumping engine; Sacramento, Cal., 2 Type 12 hose cars; Sacramento, Cal., Type 75 pumping engine; Stockton, Cal., Type 12 pumping engine; Titusville, Pa., Type 40 combination with Junior pump; Watch Hill, R. I., Type 75 pumping engine; U. S. Government, 3 Type 75 pumping en-

gines; Atlantic Highlands, N. J., Type B Brockway combination chemical engine and hose car; Atlantic Highlands, N. J., Type A Brockway combination chemical engine and hose car; Burlington, Ia., 2 Type B Brockway combination chemical engine and hose car; Etna, Pa., Type B Brockway combination chemical engine and hose car; Hanover, Pa., Type B Brockway combination chemical engine and hose car; Pulaski, N. Y., Type D Brockway combination chemical engine and hose car; Stillwater, Minn., Type 12 combination and Brockway Type D combination; Alamosa, Col., Brockway Type D chasses; Savanns, Ill., Brockway Type D combination; Hartford, Conn., Type 12 combination chemical engine and hose car; West Hartford, Conn., Type 12 triple combination chemical engine and hose car; Thomaston, Conn., Type 40 combination with Junior pump; West Hoboken, N. J., Type 31 75 ft. aerial truck and Type 12 triple combination; West Berwick, Pa., Type 40 combination with Junior pump; Milton, Mass., Type 12 triple combination; Old Forge, Pa., Type 12 combination; Utica, N. Y., city service truck; Marblehead, Mass., Type 14 combination service truck; South Bethleham, Pa., 2 Type 12 triples; Battle Creek, Mich., triple combination car; Willmar, Minn., Type 12 combination with Junior pump; Cohoes, N. Y., Type 12 combination and type 12 triple; Harrisburg, Pa., Type 31 tractor; Bethleham, Pa., Brockway Type D combination.

Electric Plant in India.—An English firm at Madras, Messrs. Best & Co. (Ltd.), has applied to the government of Madras for a license for the supply of electric energy within the municipal limits of the town of Madura, Madras presidency. The terms of the license indicate that the power to be supplied is principally for lighting, fan and heating purposes and that street lighting is to be established in at least 36 streets, but there will be a supply for industries also. The town of Madura, with a population of 134,130, and situated 344 miles south of Madras on the main railroad route to Ceylon, is one of the most important in southern India. Madura of late years has been developing commercially, due to its favorable position on the railway. American manufacturers of electrical supplies interested in the possibility of furnishing supplies for the new undertaking should address Messrs. Best & Co. (Ltd.), First Line Beach, Madras, India. This firm, among other connections, are local agents of the American and India line, of which Messrs. Norton & Lilly, Produce Exchange Building, are New York agents.

The Goodyear Tire & Rubber Company, Akron, O., has just issued a booklet on Maximum Mileage, which tells "How to Get the Most Out of Your Tires." The new booklet is the result of years of experience in building miles into tires, and, it says, should its message be heeded and put into practice, three-fourths of our annual waste in tires could easily be saved. The foreword invites the tire user to take advantage of the service that Goodyear service stations are equipped and anxious to render in the interest of tire economy. The booklet deals with the tire, the road, proper loading, inflation pressures, wheel alignment, changing of tires, the various items of proper tire care and the use of tire savers in prolonging tire life. Many valuable suggestions are advanced which every motorist might capitalize. Among these are the testing of air pressures to insure service, the avoiding of bumps which cause breaks on the inside of the tire where its pressure is unknown until the announcement comes in the shape of a blow-out, the proper use of chains, the right way to carry tubes, the proper application of brakes and many other important considerations to which tires are entitled. There is a very interesting chapter on the Tire Saver Kit, which is a collection of tire accessories designed to take care of any unexpected tire trouble on the road. The Maximum Mileage booklet may be secured at any Goodyear Service Station or by writing to the company at Akron.

NEWS OF THE SOCIETIES

(Continued from page 165.)

counting." Discussion opened by John P. McNamee, city clerk of Troy. Topic, "The Election Law." Discussion opened by Henry M. James, city clerk of Hudson. Two-minute discussion by each city clerk on what his city has accomplished during the past year; election of officers; choice of convention city for 1918; final adjournment of business sessions.

Utah State Firemen's Association.

At the annual convention of this association, held July 26 and 27 at Ogden, W. S. Horan of Park City was elected president, succeeding Harry Elmer of Mammoth. Other new officers are: First vice president, Chief George A. Graves of Ogden; second vice president, N. C. Simonsen of Brigham City; secretary, T. L. Hatch of Springville re-elected; treasurer, Reuben Simpson of Salt Lake, re-elected.

W. T. Ayland of Salt Lake was re-elected a trustee and E. D. Anthony of Salt Lake was reappointed state organizer. Brigham City was selected as the next convention city.

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

Goodrich, N. D., is to build a WATERWORKS SYSTEM. Plans and specifications were prepared by T. R. Atkinson, engineer, Bismarck, N. D.

BRIDGES being constructed by Brookfield twp., Seneca, Ill., were planned by G. L. Farnsworth, Ottawa, Ill.

SEWERS and a SEWAGE DISPOSAL PLANT are to be built by Seymour, Ia. The engineer for the work is M. G. Hall, Centerville, Ia.

Oxford, O., is to make a number of STREET IMPROVEMENTS. The engineers consulted on the work are the L. A. Boulay company, 1248 Nicholas building, Toledo, O.

Montezuma, Va., is making a number of STREET IMPROVEMENTS. The consulting engineer for the work is Arthur Pew, Forsyth theatre building, Atlanta, Ga.

A WATERWORKS SYSTEM is to be built by the town of Throckmorton, Tex. The consulting engineer for the work is Henry Exall Elrod, Interurban building, Dallas, Tex.

Eureka, Kans., is to improve its WATERWORKS. Plans for the work are being prepared by Black & Veatch, 507 Interstate building, Kansas City, Mo.

Logan county, Guthrie, Okla., is to improve about 30 miles of HIGHWAYS and to build 15 BRIDGES. The engineers for the work are Peckham & Wilkins, 606 Majestic building, Oklahoma city, Okla.

A sanitary SEWERAGE SYSTEM is to be constructed by Abingdon, Va. The consulting engineer for the work is Robert Gray, Bristol, Va.

Some STREET IMPROVEMENT being made by the borough of Carnegie, Pa., were planned by O. B. Higley, 424 South avenue, Pittsburgh, Pa.

A SEWERAGE SYSTEM is to be built by Ventura, Cal. Plans are being prepared by Olmsted & Gillelen, Hollingsworth building, Los Angeles, Cal.

WATERWORKS improvements are being made by Waverly, Ia. The engineers for the work are the Iowa Engineering Co., Chase block, Clinton, Ia.

Dundas, Ont., is improving its RESERVOIR. The consulting engineer for the work is E. H. Darling, 604 Spectator building, Hamilton, Ont.

The city of Dorval, Que., is to construct a new FILTRATION PLANT. Plans for the improvement were prepared by Dupont, Roy & Baudouin, Montreal, Que.

PAVING IMPROVEMENTS for Collingswood and Oaklynn, Pa., have been planned by Remington & Vosburg, 6th & Market streets, Camden, N. J.

In making some STREET IMPROVEMENTS in connection with its housing experiment in Lowell, the state of Massachusetts has the consulting services of Kilham & Hopkins, Park street, Boston, as architects and of Arthur C. Comey, 24 Abbott building, Cambridge, as landscape architect.

Municipal Journal

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CONSTRUCTING THE STORM KING ROAD

Methods of Construction Where Roadway Has to be Blasted in Rock Cliff Four Hundred Feet Above Hudson River —Compressed Air Used for Power Purposes—Handling Materials—Protecting Railroad Track and Trains from Falling Debris.

By A. C. PERKINS.*

For ten years New York State has been planning a road down the west side of the Hudson river, past Storm King and Crows' Nest Mountains. Two years ago, after a long delay in completing the plans, work was begun on this section. The contract, as let to the John L. Hayes Construction Company, of Yonkers, N. Y., calls for the construction of about 4¼ miles of road at a cost of approximately $300,000. All of the work is in rugged and rocky country, but along Storm King and Crows' Nest it is necessary to construct the road along what is practically a vertical wall of solid rock, rising in some places to a height of a thousand feet above the river. So steep and inaccessible are the slopes along these places, that in making surveys for the road, cans of paint were fired from a small cannon against the face of the cliff to make marks at which the engineers could direct their instruments, as it was impossible to locate many places otherwise.

Designated as Route 3 of the New York State Highway Department, this road is one of the most important in the State, and with the completion of the Storm King section between Cornwall and West Point and the linking up of the road now being constructed by the Palisades Interstate Park from Fort Lee, N. J., opposite New York City, to Bear Mountain, just south of West Point, it will make a most popular through route to the north and west. Throughout the mountain section, the road will be near the river. Heretofore the mountain section has forced a long detour inland.

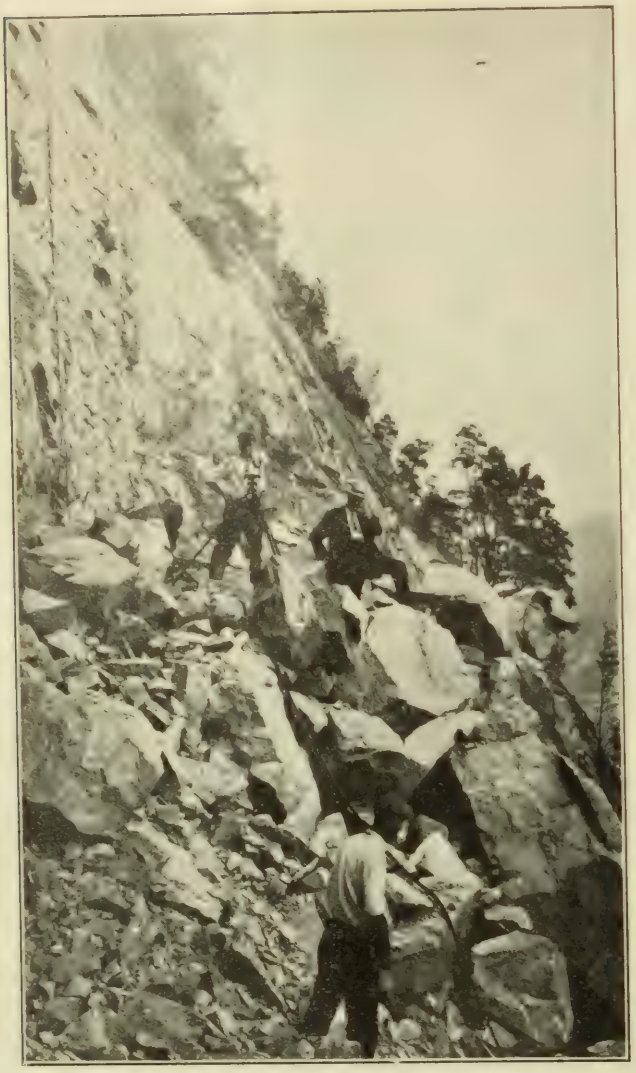
The road as now being constructed will be 24 feet wide from retaining wall to cliff and will be paved with a bituminous macadam pavement of standard construction 16 feet wide. Shoulders, each 4 feet wide, will be constructed along each side, and on the outer edge will be a rubble retaining wall and a guard wall about 4 feet high. The maximum grade will be 7 per cent.

There are many interesting features in the work, the most difficult portions of which are along the sides of Crows' Nest, where the rock on which the road is being built overhangs the tracks of the West Shore railroad, and at Storm King, where much of the drilling for the initial blasting was done by men suspended from ropes fastened 300 feet overhead. At Crows' Nest, the greatest care is necessary to protect the railroad tracks below from rock sliding down the mountain side, and at both Crows' Nest and Storm King various devices have been tried out to protect the tracks. Logs are placed alongside the rails, barricades are built, when possible, below the line of the road, shooting is done only at specified hours, and every precaution is taken to keep rock from endangering the railroad traffic. A crane is kept handy to remove any large debris from the tracks, and flagmen are stationed at all danger points.

PROFILE OF MOUNTAIN SIDE NEAR STA. 42, JUST PREVIOUS TO STARTING DRILLING

Work is going on at four points. Rough grading is being carried on north of Storm King along a steep and rough hillside where the sidehill slope is nearly 45 degrees. Here a crane is employed, mostly for moving large rocks and for placing the wall stones where it is necessary to construct a wall. Work has been temporarily halted here. On the front of Crows' Nest some blasting work is going on. At the ravine between Storm King and Crows' Nest, a big culvert with an opening 10 x 15 feet and 154 feet long is being put in. Nearly 60 feet of fill must be placed over this culvert, requiring about 36,000 cu. yds. This culvert is practically the only place on the work where machinery can replace hand labor to any great extent. Considerable

*Engineer in charge for the contractor.

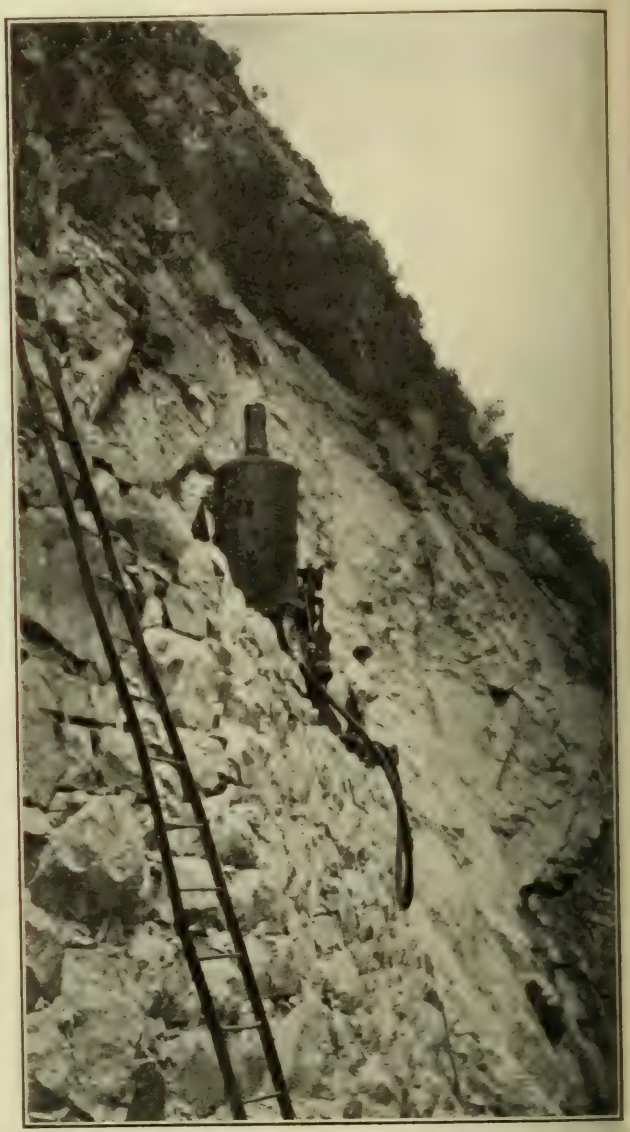


ROUGH WORK FOR THE ENGINEERS.

excavation is necessary in earth just south of the culverts, the earth being used for filling over the culvert. The work is being done by a Marion steam shovel, equipped with a ⅝-yd. dipper. The 2-yd. dump cars of 36-inch gauge are used to transport the earth from the cut to the fill over the culvert. This outfit, on a 200-yd. haul, handles about 300 to 400 cubic yards a day.

A great deal of work is being done along the face of Storm King, where a roadway is being blasted along the rocky face of the mountain. Here practically all of the material has to be moved by hand after blasting, owing to the fact that machinery cannot operate on account of the lack of space. For the first drilling, men had to be lowered over the cliffs by ropes. As soon as a shelf was established, work was carried on from this. When the shelf reached approximate grade, a retaining wall was constructed. In this work, it was necessary to complete the road in one operation as machinery can be moved forward no faster than a complete roadway is provided for it.

The usual procedure for this work is to drill a line of holes at the top of the cut slope with Jackhammer drills, the drillers and machines being supported by ropes hung from above. These holes are blasted, leaving a narrow bench on which it is much easier to work. Of course, much of the blasted material falls down the cliff —a distance of 400 ft. This operation is continued until a level is reached from 15 to 25 ft. above grade. The cut is then faced at right angles to the line of the road, the outside hole being placed at about double the usual distance from the edge of the cut. This corner piece acts as a buffer, and allows a sufficient charge to be used to crack the stone while not throwing it down the mountain. The stone is then removed by the crane, the more regular pieces used to construct the wall and the remainder placed in embankment. Every effort is used to



RETAINING WALL AND CRANE FROM BELOW. DRILLS AT WORK IN DISTANCE ON CUT.

retain as much as possible of the blasted ledge, as the surplus is needed for filling at the ravine between Crows' Nest and Storm King. To carry this material, horse-drawn cars running on a construction railway will be used. The most troublesome transportation problem has been that of carrying the drill steel from the blacksmith shop to the drillers and back.

As stated before, it is necessary to construct the road practically at one operation, as for the most part it is half in excavation and half in embankment and no machinery can be moved forward in advance of the wall construction. The wall varies in height, according to the topography, in some places requiring a height of 50 ft. It is constructed of dry rubble except in the lower part, where it is laid up in mortar and has a batter of 1 inch to the foot on the outside and of 4 inches to the foot on the back. A guard parapet 4 ft. high, laid up in mortar, is built along the edge of the road. This

is topped with jagged pieces of rock set in mortar. Weep pipes are placed at intervals of 10 ft. in the retaining wall. In constructing the wall, a Wilson crane, operated by compressed air, is used, the crane being supported on the wall, as shown in the cut, and moving forward as fast as the wall is laid up.

The preparing of the wall footings on the steep ledge slopes has required constant attention and study, as the formation of the rock encountered varies greatly and it is necessary to obtain a level foundation without shattering the rock on which the wall is to be built. The boldness of the topography of the location allows the engineers almost no latitude in changing alignment to meet conditions encountered in excavating wall footings.

Inasmuch as the cranes which build the walls must be supported on the wall already built, it has been found advisable in many places to build the wall in two or more stages, so that the lower level of the wall may be used

CRANE WORKING ON RETAINING WALL FOR ROAD AT STORM KING.

as a roadway on which to transport material to complete the wall.

All the machinery, with the exception of the steam shovel, is operated by compressed air. This was a practical necessity as the cost of transporting coal up the mountainside would be high (coke is used for the steam shovel), little space is available for steam pipes and the danger of accidents due to burns resulting from the hot pipes is great. Also the heat loss would probably be considerable, and as distances are comparatively great, several boilers would be necessary, with additional men. Air is furnished from a compressor plant located on the north slope of Storm King and is transmitted to the work through 27,000 ft. of air line, ranging in size from 2 to 6-inch. In hot weather, condensation is rather troublesome and numerous blow-offs must be provided, but no trouble is encountered in cooler weather.

The compressor plant is one formerly used in the construction of a section of the Catskill Aqueduct and was purchased from the Oscar Daniels Company. It consists of an "Imperial" Ingersoll-Rand compressor of 1,300 cu. ft. capacity per minute, driven by a 200-h.p. General Electric motor. Power is furnished by the Central Hudson Gas and Electric Company. The load on the compressor is made up of 15 Bull Moose drills and 10 jackhammers, all made by the Ingersoll-Rand Company, 2 Wilson cranes and 4 derricks. Pressure is usually maintained at about 90 pounds.

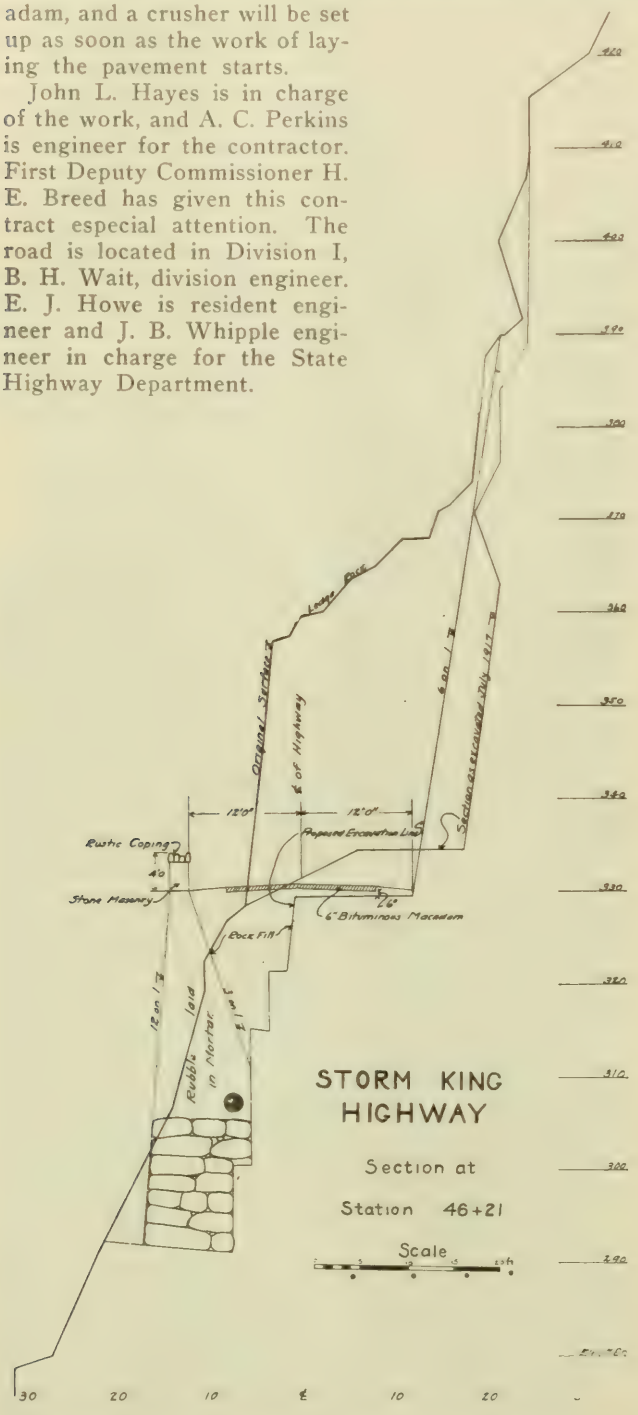
Of necessity, hand methods prevail largely in bringing construction materials to the work. Sand and cement are brought by boat to a point on the river bank, near the work, carried by hand across the railroad tracks and hauled by mule and stoneboat up the precipitous mountainside to the road. At Storm King, where the Storm King Stone Company held up the state for some time, it was necessary to take one of the cranes to pieces and pack it 12 miles by a trail cut over the mountains. A

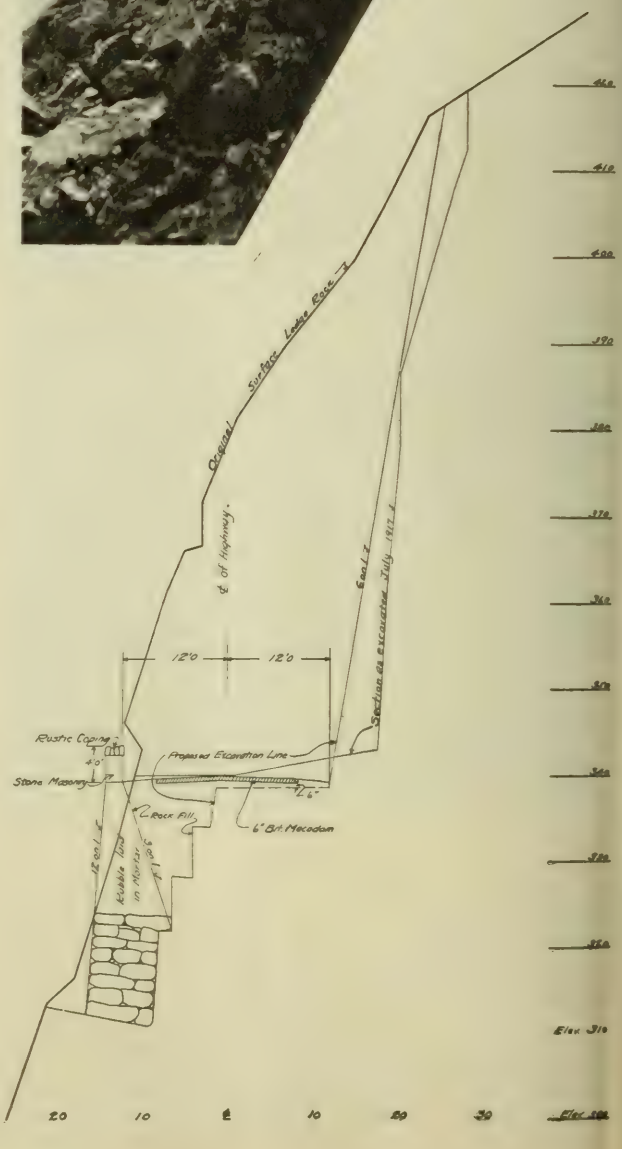
CUT ON FACE OF STORM KING, RETAINING WALL AND CRANE.

hand-operated cable road also has been maintained for hauling where it is too steep for horses or mules.

The rock is a tough gneiss which fractures with very sharp edges. Du Pont 40 per cent dynamite is used for blasting, but no large blasts have been set off, the largest to date firing about 400 pounds of dynamite. A short time ago motion pictures were taken showing construction work and blasting. The stone is suitable for macadam, and a crusher will be set up as soon as the work of laying the pavement starts.

John L. Hayes is in charge of the work, and A. C. Perkins is engineer for the contractor. First Deputy Commissioner H. E. Breed has given this contract especial attention. The road is located in Division I, B. H. Wait, division engineer. E. J. Howe is resident engineer and J. B. Whipple engineer in charge for the State Highway Department.





The sections above and at the right show the amount of rock necessary to be moved and the difficulties to be overcome by the contractor in constructing the road along some of the steeper places. In the section above, the base of the retaining wall is nearly 40 feet below the finished roadway and excavation had to be carried on between elevations 290 and 410, 120 feet in all. On the section shown on the right it was impossible to get a foothold, and men were lowered by ropes to do the preliminary drilling. The photograph above and on the right shows the view south from station 110 at Crow's Nest. The right-of-way can be seen on the next point.

MANHOLE FOR SEPARATE SEWERS IN SAME TRENCH.

The city of Piqua, Ohio, has constructed systems of house and storm water sewers and occasionally it has been more convenient and less expensive, with the material found in the trenches, to put the two sewers in the same trench. This is almost always possible in reasonably level country because the house sewer must be deep to serve the cellars of houses on abutting property, and the storm sewer need be deep enough to serve only the street inlets and catch basins.

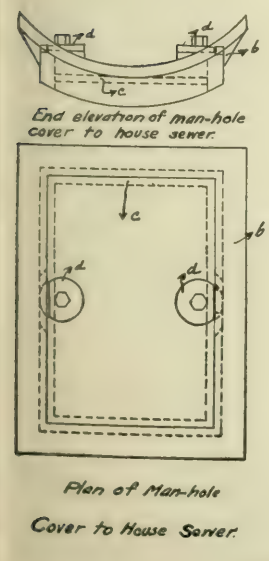
The accompanying illustration shows the design of a combined manhole for the two sewers which does not interfere with the alignment of either sewer and still keeps them entirely separate. In the manhole shown, the storm sewer is a 4-foot concrete sewer and the house sewer is of 24-inch vitrified pipe set in concrete immediately under the bottom of the storm sewer.

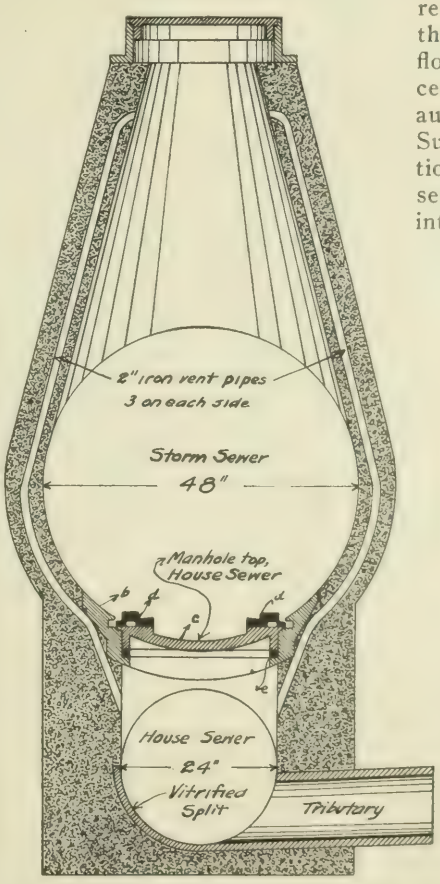
The section of the manhole shows the bottom of the sewer through the manhole to be of split 24-inch pipe with the tributary entering at the bottom. Frequently, if not always, the branch sewer can enter slightly above the bottom if so desired. The sides of the sewer are brought up vertical to the invert of the storm sewer, in the concrete of which is placed a rectangular, cast-iron frame *b*. (This is shown in cross-section in the manhole drawing and in plan and end view in the detail drawings.) In the proper recesses in this frame is set the manhole cover of the house sewer *c*, with ribs projecting downward to rest on rubber gaskets *e*, to make the joints gas- and watertight. To hold the cover in place, cam-shaped latches *d* are provided which turn on pins. The pins may or may not be provided with threads. A half turn of each of the two latches turns the larger side into a recess in the frame and they wedge the cover down to a tight bearing. The cover is very nearly fool-proof, especially if the latches are attached to the pins so that they cannot be lost when the cover is removed for inspection of the house sewer. The cover need not be designed with reference to its removal through the street manhole opening. Indeed, it will ordinarily be larger.

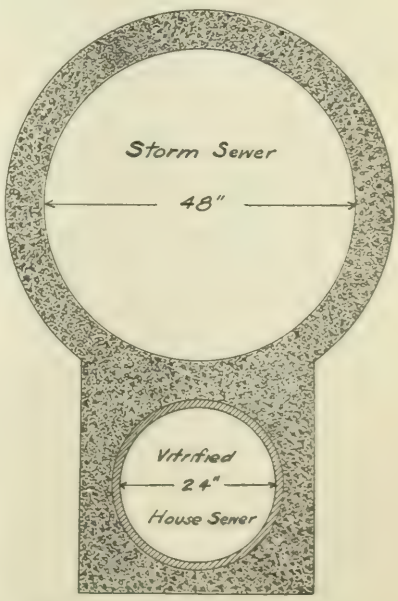
To provide for ventilation of the house sewer, there are six 2-inch iron vent pipes opening at the bottom above the water level of the house sewer and at the top in the manhole well above any possible water level in the storm sewer. The street manhole cover is perforated.

The structure was designed and built by Albert Schroeder, city engineer of Piqua, and is reported to be satisfactory both as to economy of construction and ease and certainty of operation.

The house sewer cannot be examined when storm water is flowing, but that is seldom or never desirable. Storm water can, on occasion, be used for flushing the house sewer when the depth of flow in the storm sewer is not too great to prevent removal of the manhole cover of the house sewer.







CROSS-SECTION OF MANHOLE AND OF SEWERS BETW EEN MANHOLES.

SEWAGE DISPOSAL AT FITCHBURG

Report on Operation During Year 1916—Scum and Sludge in Imhoff Tanks—Growths and Ice on Filter—Handling Sludge.

The sewage disposal plant of Fitchburg, Mass., has been described in previous issues of Municipal Journal, and reference made to some of the early experiences in its operation. The reports of David A. Hartwell, superintendent of sewers, and of F. W. Jones, supervising chemist in charge of the plant, detailing the operation of it during the year 1916, contain many interesting items, many of which may be of value to those in charge of similar plants elsewhere.

At the time of beginning the construction of this improvement, the sewers were all on the combined system, and most of them have remained so, although it is proposed to change them to the separate system as soon as possible, and all of the new sewers have been built upon the separate system.

Some of the connections with the trunk sewer which brings the sewage to the disposal plant are provided with regulators intended to permit only three or four times the dry weather flow to enter the trunk sewer, the excess volume in times of storm being automatically discharged into the river. Such regulators need frequent attention to prevent clogging and the consequent discharge of all sewage into the river. The steady and con-

siderable increase in the volume of sewage to be treated, caused by the entrance of storm water, undoubtedly increases the difficulty of operating the disposal plant at its maximum efficiency. Ordinarily when the amount of storm water becomes very considerable and there seems no probability of immediate decrease, a blow-off in the siphon at the river crossing is opened and the diluted sewage is turned into the river.

The working of the Imhoff tanks as a whole has been very satisfactory. No foaming occurred, and the scum has varied in thickness from practically nothing in some sections to 3½ feet in others, but was inoffensive. The scum is thicker in the chimneys than in the side vents, and thicker in the end chimneys than in the middle ones. It was allowed to remain undisturbed, except that holes were poked through it occasionally to permit the gas to escape.

During June, owing to continued wet weather and the fact that three of the tanks were full of sludge owing to pumping therein the sludge from the secondary tanks, the efficiency of sedimentation was greatly reduced and the surface of the tanks became unsightly with sludgy froth. The average removal of settleable solids during this month, as measured by readings of the daily composites in the conical glasses, was only 80 per cent, while it averaged 97.5 per cent for the other months. As soon as sludge was withdrawn from the full tanks, the froth disappeared and the tanks produced the usual good results.

The amount of total suspended matter removed by the tanks, taken by months, varied from 43 per cent in June to 78 per cent in July, averaging 70 per cent. In addition to this, dry sludge from the secondary tanks was added amounting to about 13 per cent as much as that settling out in the Imhoff tanks. The flow was reversed five times and measurements made from time to time showed that, after the hopper bottoms are filled, the depth of sludge in each tank remains uniform.

On July 17 a green growth covered the surface of one tank and appeared in smaller amounts on the other tanks. Chloride of lime was sprinkled over the surface, and the next morning the growth had disappeared.

The slots are poked almost daily to prevent floating patches of sludge, and the surface is skimmed when necessary so that the tanks usually present a well-kept appearance.

The detention period, with five tanks in use, has varied from two hours with a rate of 10,000,000 gallons, to ten hours or more when the rate fell below 2,000,000 in the night. With a rate of 3,000,000 gallons the detention period is seven hours.

The sprinkling filter treated an average of 1,399,200 gallons per acre per day when the whole bed of 2.1 acres was in use. During a period of about five weeks eight distribution lines were shut off, leaving 1.14 acres to treat the entire flow of 74,705,000 gallons, or an average of 1,909,000 gallons per acre per day. During this period the effluent was of good quality and nonputrescible. During the succeeding three days that portion of the bed that had been out of service was operated alone, and the final effluent was very brown and cloudy and was unstable. This was the only instance during the year when the methylene blue bottles lost color.

During the summer a heavy growth covered the surface of the filter, which could be peeled off readily in thick leathery chunks. On the under side of this growth were found bunches of small red worms and thread-like white worms. Both of these kinds were found also on the stones beneath the surface. Although the growth was profuse, there was no pooling whatever on the filter at any time, and when the filter was shut off the growth dried up and for the most part was washed away when operation was resumed.

During the first week of April, when the sewage flow was high due to thaws, the whole filter was by-passed and the surface stones loosened to a depth of about 8 inches with picks. The odor was not dissimilar to that of a salt marsh. The stones were dirty, but after operation had been resumed and the unloading began, they became clean and healthy. The bulk of the unloading occurred in June.

Small white flies (commonly found around sprinkling filters) caused comparatively little annoyance this year, being neither numerous nor troublesome. The cold spring and abnormally wet weather in June may have accounted for their non-appearances.

Under regular operation there was little stoppage of the nozzles, matches which passed through the Imhoff tank screens constituting more than 75 per cent of the material removed from them. In winter, growths detached from the dosing tank walls and distribution pipes caused some trouble and accounted for most of what few nozzles were found frozen.

Ice on the filter has not been a serious handicap to its operation. When the weather is intensely cold and the wind strong, ice appears as "nubbles" over the entire surface, but as soon as the wind dies down the bed becomes clear except for ice "doughnuts" around the nozzles.

The crude sewage is coldest during thaws, sometimes reaching 35°. On February 14, the coldest day of the year, the air reached a maximum of 18° and a minimum of —5°, while the crude sewage had a maximum of 47.3° and a minimum of 43.3°, the Imhoff effluent had a maximum of 45.1° and a minimum of 39.7°, the sprinkling filter effluent had a maximum of 35.6° and a minimum of 32.9°, and the final effluent had a maximum of 35.2° and a minimum of 32.0°. A test made during the second day of a hot spell showed the air temperature to have a maximum of 92° and a minimum of 68°, crude sewage, 68.4° and 68.0°, sprinkling filter effluent 73.8° and 71.2° and final effluent 75.2° and 71.6°.

The final effluent from the secondary tanks was well saturated with dissolved oxygen, odorless and more attractive in appearance than the river into which it flows.

The average specific gravity of the sludge as it entered the sludge bed varied from 1.047 to 1.081, averaging 1.065; the per cent of solids varying from 11.36 to 17.02 and averaging 14.90. The sludge had a tarry but not unpleasant odor, was strongly alkaline to lacmoid but not to phenolphthalein, and at no time caused any nuisance. In order to insure a more uniform depth of sludge on the bed, it was necessary to use a large squeegee which one man can push readily along the rails of the track. The average depth for all but the last dose was 8.9 inches; but in the latter part of October, the last sludge removal until spring, 11.5 inches was discharged upon the bed and allowed to lie there all winter. It was found that while a depth of 10 to 12 inches requires too long a period to dry, a depth of 8 to 9 inches requires little longer than 6 to 7 inches and is therefore more satisfactory.

The summer was very wet and rain came within 48 hours after each pumping of the sludge, and it is not known how long it would require a sludge to dry if not rained upon. As soon as it became stiff it was turned with mason's hoes, which hastened the drying appreciably.

Careful estimates were made of the quantity of sludge handled and representatives samples were taken, for analysis, of both wet and dry sludge. The importance of proper and frequent sampling has been demonstrated

and too much emphasis cannot be placed on this part of the work.

The shrinkage in volume of sludge between pumping and removal varied from 52.8 per cent to 61.7 per cent, averaging 55.9 per cent. The weight per cu. yd. as hauled varied from 1,278 to 1,559 pounds, averaging 1,415. With each cleaning 4 to 5 cu. yds. of sand were removed from the bed with the sludge, to the bottom of which it adhered. About 6 to 8 cu. yds. of rakings in addition to the sludge was taken from the beds at every cleaning.

The sludge has been disposed of in various ways. A small amount has been carted away by farmers, some has been used for filtering, some for fertilizing the shrubs planted in the grounds around the disposal works, and some as top dressing on the adjacent land. To test its fertilizing value, 1/15 of an acre of poor, sandy, virgin soil was planted with potatoes, using sludge only as a fertilizer. A crop of 12 bushels was harvested, of good size, clean and without a single rotten potato. The cost per cubic yard for removing the dry sludge averaged 41 cents, this including crating and preparing the bed for the next pumping. Labor was paid 32 cents per hour, team and driver 75 cents, and foreman 40 cents.

WATER CONSUMPTION ESTIMATE.

The water commissioner of St. Louis, Mo., Edward E. Wall, in 1914 prepared an estimate of the probable consumption by the city for the next few years. Comparison of this estimate for 1916 with the actual consumption during that year is interesting. The figures (in millions of gallons) are as follows:

Period of Time	Estimated	Actual
Average daily consumption for the year	93.6	97.6
Average daily consumption per maximum month	117.0	118.4
Consumption for the maximum day	140.4	133.7
Consumption rate for maximum hour	210.6	210.5

BLOWING DUST FROM MACADAM.

In preparing macadam roads for the application of tar or oil, it is generally desirable to remove all dust from the top of the road to permit the bituminous material to penetrate the stone. Where a portable air compressor is available, this can be done by blowing it off; which is the best way, for it cleans out the upper interstices, while brooming only packs the dust into them. One plan is to attach to the end of the air hose a T-shaped set of pipes formed of a T and three pipes, a row of small holes being drilled in line in the two pipes that are fastened in line in the opposite openings of the T. This set of pipes is held in the hand or may be fastened under the wagon carrying the air compressor so as to come an inch or two above the road surface and with the air jets making a slight angle with the vertical, blowing the dirt in the direction in which the wagon is moving.

COMPULSORY FLUE CLEANING.

In his annual report for 1916, George Wead, fire marshal, of Houston, Tex., recommends the passage of an ordinance making it compulsory on property owners and tenants to clean the flues of their buildings every year, and fixing a maximum price for the work. The cleaning should be done under the supervision of the fire marshal, and records kept. When a fire occurs that can be attributed to unclean flues, a penalty should be imposed. Marshal Wead states that nearly 30 per cent of the fires are due to unclean flues, and that this percentage can undoubtedly be reduced considerably by the enaction of this ordinance.

COST OF CONSTRUCTING PAVEMENTS IN ST. PAUL BY FORCE ACCOUNT IN 1916.

Street or Ave.	Type Foundation	Laid Surface Wearing	Filler	Total Area.	Cost of Foundation Materials: Cement, per bbl.	Sand, per cu. yd.	Brick Stone, per cu. yd.	Cost of Wearing Asphalt and Asphaltic Concrete Paving: (Gravel, per cu. yd.	Asphaltic Cem. ton.	Fine Sand, cu. yd.	Coarse Sand, cu. yd.	Limestone Dust, ton.	Binder Stone, cu. yd.	Surface Materials—Brick Paving. Asphalt Filler, ton.	Brick, sq. yd.	Creosoted Bl. Pav. Creo. Block, sq. yd.	(Cost of Crushed Stone Sand, cu. yd.	Preparing Headbed.	Concrete Foundation.	Wearing Surface	Miscellaneous	Total Cost	Total Pavement Cost
														—Cost Per Sq. Yd.—									
Canada	5" Concrete	2" Asph. Con.	.....	5,539	$2.12	$1.00	$1.80	$	$16.40	$0.85	$0.74	$3.60	$2.00	$	$	$	$	$ 1.08	$ .5877	$ .5030	$ .2192	$1.0067	$7.222.41
Fourteenth	5" Concrete	2" Asph. Con.	.....	6,227	2.07	1.00	1.95	....	16.40	.85	.71	3.60	2.00	.....	.....	.....	.....	.3365	.7264	.4320	.1749	1.6885	10,839.78
Mississippi Blvd.	.....	.....	.....	.....	....	....	....	....	....	...	...	....	....	.....	.....	.....	.....	....	....	....	....	.....	.....
Prescott	5" Concrete	2" Asph. Con.	.....	4,670	1.75	1.15	1.84	....	16.40	.85	.74	3.60	2.00	.....	.....	.....	.....	.1756	.7322	.5047	.1579	1.3704	7,249.12
Wacouta	5" Concrete	2" Asph. Con.	.....	2,352	2.12	1.00	1.77	....	16.40	.85	.74	3.60	2.00	.....	.....	.....	.....	.2244	.6066	.4232	.1466	1.3348	3,219.60
Eleventh	5" Concrete	Brick	Asph.	1,591	2.07	1.00	....	....	....	....	....	....	2.00	15.85	1.06	.....	.....	1.00	.3857	.7370	1.4940	.0758	2.4784	4,255.21
Oakdale	5" Concrete	Brick	Asph.	1,565	1.75	1.15	1.84	....	....	....	....	....	....	15.85	1.06	.....	.....	1.15	.3029	.7946	1.4880	.0677	2.4532	7,847.70
State	5" Concrete	Brick	Asph.	2,405	1.75	1.15	1.84	....	....	....	....	....	....	15.85	1.06	.....	.....	1.15	.3029	.7946	1.4880	.0677	2.4532	.....
Como West	5" Concrete	3½" Creo. Blk.	Pitch	839	1.75	1.25	1.84	....	....	....	....	....	....	.....	.....	14.00	1.48	1.25	.3287	.9287	1.9773	.1163	3.4510	1,576.46
Eleventh	5" Concrete	3½" Creo. Blk.	Pitch	2,915	2.07	1.00	2.20	....	....	....	....	....	2.00	.....	.....	12.74	1.48	1.00	.3857	.7879	1.4982	.0758	2.4476	7,447.29
Grove	5" Concrete	3½" Creo. Blk.	Pitch	5,229	2.07	1.00	1.95	....	....	....	....	....	....	.....	.....	12.74	1.48	1.00	.3071	.7321	1.4705	.0741	2.3945	15,288.20
Holly	5" Concrete	3½" Creo. Blk.	Pitch	9,010	2.25	.90	....	1.48	....	....	....	....	....	.....	.....	12.74	1.47	.95	.3571	.7563	1.4682	.0665	2.4481	21,880.40
Summit	5" Concrete	3½" Creo. Blk.	Pitch	562	....	....	....	....	....	....	....	....	....	.....	.....	.....	.....	.....	.6450	.6485	1.6875	.0410	2.4885	3,483.96
Wright's Ke	5" Concrete	3½" Creo. Blk.	Pitch	1,239	2.07	1.00	1.65	....	....	....	....	....	....	.....	.....	12.74	1.48	1.00	2.313	.6334	1.7399	.1088	2.7821	3,476.71

WORK ON CALUMET INTERCEPTING SEWER

Excavating in Quicksand and Clay with a Steam Shovel and Drag Line—Handling Excavated Material and Concrete Aggregate.

By ALBERT R. REILLY.

On Section 7 of the "Calumet Intercepting Sewer" is an outfit similar to those of other sections being built for the sanitary district, yet more complete and individual than any.

This contract, which connects into the Calumet-Sag Channel, and is over two miles in length, is being constructed by T. J. Foreschuer & Co. The "Croton" section is used, the arch being 18 in. at the crown, with side walls 3 ft. 9 in. and minimum thickness of invert 21 in. The opening is 16 ft. wide by 16 ft. high. The concrete is mixed 1 : 2½ : 4½.

The excavation is in 5 to 10 ft. of sand and top soil, the remaining 20 to 25 ft. being blue clay. Quicksand is encountered in places, requiring the use of sheathing.

The material storage, shop, storehouses and offices are located at about the half-way point, near the Panhandle track crossing.

Separate service tracks supply concrete material to the mixer, and take away the excavation to the spoil area located one mile east of the discharge chamber, on the Panhandle R. R. property.

A Marion special shovel with a 40-ft. boom and 2½-yd. bucket excavates the top 10 to 12 ft. of the ditch, which is cut about 60 ft. wide. This allows of a considerable settlement and drying out of top strata before the "drag-line" comes along. A gasoline pump keeps the water out.

Three Vulcan locomotives with 10-car trains of Western side-dump, 6-yd. cars on a standard-gauge track carry the dirt to the spoil area. These trains also serve the "drag line."

The drag is a Bucyrus with a boom and 2-yd. Page bucket. A special bucket is required to dig the clay, which must be cut vertically. The cut is later trimmed by hand by four bottom-men.

The material dug is hauled by train to the back-fill, where eight men and a foreman dump cars, clean up, and shift track. The surplus goes to the spoil area.

The service to both machines is good, allowing the drag to dig approximately 800 yds. per day. The shovel could dig 2,000 yds. if necessary.

One man besides the runner and fireman manipulate the drag. Four laborers are required to run the shovel, besides the runner, boom-man and fireman.

One brakeman on each train spots cars, throws switches, etc.

One foreman and eight men dump cars, move track, etc., on the spoil area dump.

CONCRETING.

The material is unloaded from cars on a spur of the Panhandle R. R., which bisects the job, by a Brown hoist, which places it in bins which hold about 18 cars of stone and 6 of sand. The bins have a total length of 140 ft., are 9 ft. high and have 8 ft. wide clearance. The narrow gauge tracks (36-in.) run under the bins, allowing trains of ten Easton cars of tipple type, hauled by Vulcan "dinkies," to pass under and be loaded from chutes in the bottom of bins.

Into these cars the stone and sand are loaded in the right quantities for the mix used. The train now goes to the cement platform, which is so located that bags are carried directly from the railroad cars and dumped into service cars, making each car carry its 40 cu. ft. to the mixer.

Two cement sheds of six-car capacity are located on the spur. Sand and stone are stored on the ground between the spur and the main line.

Three Vulcan dinkies with 30 cars of Easton type serve the mixer. Each has a brakeman and an engineer.

Four men help at bins and clean cars with the hoist. Four men handle cement.

The mixer, a special Foote of 40 cu. ft. capacity, is provided with flanged wheels which run on a standard gauge. Outriggers of 6 in. I-beams, with hooks and jacks, provide stability against the drag of a 35-ft. chute.

Four men besides the dumper and engineer dump cars and move track. One man handles the chute and two move concrete forms.

The mixer's capacity is about 350 yds. in a ten-hour day, or 50 ft. of sewer, mixing one minute.

The forms are Blaw steel forms in sections 25 ft. long, seven sections being used. They are moved after 48 hrs. by four men with the aid of a gasoline engine. The forms are collapsible and are moved forward by night in units. Four carpenters set bulkheads, braces and other wooden forms for the arch.

The blacksmith shop and its two workers, with the office and its material-clerk, timekeeper and straw boss, complete the employed.

Ralph H. Burke is division engineer and S. Mehner is resident engineer.

USING OLD STONE PAVING BLOCKS.

In Cleveland, Ohio, a new lug wood block pavement is under construction on Euclid avenue, taking the place of an old Medina stone block pavement, much of which has been in use for many years. At the time the stone block pavement was laid, the requirements as to dressing of the blocks to parallel faces and straight edges were not so strict as at present, and the years of wear have not improved their appearance. Nevertheless, the city is relaying the blocks in what must be a temporary pavement on the driveway passing the new court house and the new city hall, which are on the corners of Cleveland's great plaza nearest the lake. These two buildings are the only ones yet constructed at the north end of the plaza and the extension of the space north, to connect with the proposed new Union railroad station and park beyond, is yet to be made. When this construction is nearer completion a handsome pavement will be required. Meantime the temporary pavement is being put in, using the old materials from Euclid avenue. The pavement is laid on the graded natural soil with a sand bed on top of a depth sufficient to insure a firm bearing for all blocks, whatever the variations in their depth may be. On account of the irregularity of the blocks, the joints are far from uniform, and near the surface of the pavement are often very wide. The joints are filled with a bituminous filler of which a very large quantity is required, and sufficient sand is spread over this to cover it. The stones are tamped into place with hand tampers immediately before the hot bitumen is poured.

Curbs are also omitted, the cross-section showing a gutter formed by paving a slope up to the elevation of the lawn and sidewalk. It is questionable whether this construction is economical under the circumstances.

SEWER HOUSE CONNECTIONS IN FITCHBURG

House connections with sewers in Fitchburg, Mass. are usually constructed wholly by the sewer department but the owner is allowed to do the digging and back-filling of the trench on his own land if he desires to do so. Al of the pipe, however, is laid by an employee of the department. The cost of all work between the building and the main sewer is charged to the owner of the building.

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Subscribers are requested to notify us of changes of address, giving both old and new addresses.

Contributed Articles and Reports.

Contributions suitable for this paper, either in the form of special articles or as letters discussing municipal matters, are invited and paid for.

City officials and civic organizations are particularly requested to send Municipal Journal regularly their annual and special reports.

Information Bureau.

Municipal Journal's Information Bureau, developed by twenty-one years' research and practical experience in its special field, is at the command of our subscribers at all times and without charge.

THE DEMAND FOR ENGINEERS.

A few weeks ago, soon after the United States entered the war, it looked as though our colleges would be almost deserted for the next year or two, so general was the ambition among the students to enter some branch of the militant forces of the country. At that time certain federal officials endeavored to stem this rush to abandon their studies by pointing out the necessity which would exist during the war, and still more that which would arise after the war, for the services of technically trained men; and they urged not only that those who were now engaged in technical studies continue these to the end of their course, but also that considerably greater numbers should begin such courses at once in order that they might be prepared at as early a date as possible to assist in the reconstructing of destroyed utilities in Europe, and the development along the most modern lines of those in the recent republic of Russia and possibly in other countries whose future may be directed by the war into more ambitious and modern lines.

This protest against the emptying of the technical schools has, we believe, had some effect, and we hope to see the classes entering these schools next fall greatly increased in number over those of the past. This will provide engineers four years from now, but it is hoped that the demand occasioned by peace will arise within one or two years; and if it is to be met, it must be met by the students who next year will be in the junior and senior classes. We do not know what view the exemption boards will take of this matter, but it is to be hoped that they will refuse to draft into any service men who are engaged in technical studies along lines which will be of service in the reconstruction and enormous development which will undoubtedly follow the establishing of peace.

When war broke out, most of the engineering schools abroad shut down wholly or partially, both students and faculty devoting themselves to some form of military work, and engineers and other technical men who entered the army have been greatly reduced in numbers on the battlefields. There is every indication, as stated above, that during the next few years the demand for technically trained Americans will be at least double what it has been in the past, and an opening will be offered for engineers such as that profession has never previously known.

UTILIZING TRADE WASTES.

The United States has experienced a jolt during the past year that has brought it to a partial realization of how extravagant it has been in the past, and an effort toward greatly increased economy as well as efficiency is now being made in all directions and by all classes. We have referred in previous issues to the saving of food before it reaches the garbage pail rather than endeavoring to recover from it afterward a much smaller value by utilization processes.

Another form of saving on which the Federal Government is working is in connection with trade wastes. The Public Health Service has for some time been seeking to assist manufacturers in avoiding the pollution of streams with their trade wastes. When this technical and diplomatic work was first started the former was confined to developing satisfactory and economical methods of purification; but so much material was found getting away with the liquid wastes that it seemed advisable, especially under present conditions, to include the recovery of waste products as part of the regular investigation. Much of the sludge or solids recovered from several kinds of plants (tanneries, for example) have been found to have considerable fertilizing value; for the sulphide wastes from paper plants several uses have been found, and it may be accepted as almost certain that if our chemists will turn their attention more earnestly in this direction and the manufacturers will encourage them and sufficiently appreciate the importance in the aggregate of what may at first seem to be small returns, some use may be made of almost every class of waste. Past history is full of illustrations of enormous profits obtained by recovering valuable by-products from ore tailings, fumes and other solids, liquids and gases which previously had been carelessly thrown away.

A "GOOD ROADS" ORATOR'S HANDBOOK.

We doubt if there is any subject upon which so many millions of words have been spoken during the past five years as that of good roads. A publication several times the size of Municipal Journal could be filled weekly with clippings from daily newspapers, reports of good roads organizations, etc., giving speeches on the subject. And probably all the arguments and figures worth giving could be boiled down into one speech of moderate length.

This boiling down has actually been done by the U. S. Office of Public Roads, which has prepared, for the benefit of those who wish to speak on the subject, a standard lecture, accompanied by a series of notes on all features of the subject, from the initial work of arousing interest in good roads to the maintenance of the roads after they are built. This should serve a good purpose, for undoubtedly many public officials are called upon at times to speak on the subject who have little definite and reliable information concerning it, and use of this handy speaker's manual should result in making their speech more informative and of real assistance to the good roads movement.

EXPERIMENTAL ROADS IN IOWA

Results of Experiments with Bituminous Carpet Coats on Gravel and Concrete—Oil Recommended—Method of Applying.

Two experimental gravel roads, one on the Hawkeye Highway leading out of Fort Dodge and the other leading out of Rockwell City, built in 1915, were given bituminous carpet coats in 1916. The Fort Dodge road came through the winter in good condition for treatment. The one at Rockwell City became uneven and wavy and had to be scarified, reshaped and rolled before being treated.

In carrying out the work, in each case, the road surface was swept with a horse-drawn sweeper to remove the dust. Liquid asphalt was then applied cold, at the rate of one-half gallon per square yard in two applications of one-fourth gallon each, by means of a pressure distributor. Following the second application, coarse sand was spread over and broomed on the surface. Patrolmen were kept on the road for several days, adding additional sand where needed and spreading it over the surface. The oil asphalt used had the following analysis:

Specific gravity at 97° F.	.9597
Specific viscosity, 100 c.c. at 50° C. (Engler)	31.0
Loss on heating 5 hrs. at 163° C.	18.65%
Character of residue	Thick and sticky
Total bitumen	99.89
Bitumen insoluble in 86° naphtha	8.49
Fixed carbon	6.12
Ash	.21
Flash point (open cup)	144° F.
Burning point (open cup)	165° F.

The same type of oil asphalt and application method were used on four miles of the Des Moines-Ankeny road. Two miles of the road were treated with a different grade of oil, one which had proven very satisfactory on earth roads of medium traffic.

Results so far have not been conclusive in the case of the gravel roads. On the Fort Dodge road the surface was found in very good condition. The Rockwell City road had been badly damaged by the passage of heavy tractors. The Des Moines-Ankeny road demonstrated that a bituminous carpet will not hold upon a cinder surface under heavy traffic. The mat wore away in spots, due to crumbling of the cinder road bed underneath. The portion treated with ordinary road oil also became uneven, but not to the same extent.

In 1915 an experiment was started to determine the relative value of different materials for bituminous carpets for concrete roads. A road at Mason City was treated with a number of materials as follows:

Length.	Nature of Treatment.
620 feet	½ gallon tar in one coat.
130 feet	Binder coat of tar followed by ¼ gallon soft natural asphalt.
90 feet	Binder coat of tar followed by ¼ gallon soft oil asphalt.
525 feet	½ gallon per sq. yd. of mixture of 80% oil asphalt and 20% natural asphalt.
80 feet	½ gallon per sq. yd. of oil asphalt.
225 feet	½ gallon per sq. yd. of a mixture of 80% natural asphalt and 20% oil asphalt.
60 feet	Binder coat of natural asphalt cut back with naphtha followed by ½ gallon of natural asphalt.
100 feet	½ gallon per sq. yd. of natural asphalt.

The surface was dressed with trap rock chips of a size that would pass a ½-inch screen.

On several sections the surface peeled off along the wheel track and this continued and extended until little of the bituminous material was left. Generally speaking the sections upon which oil asphalt was used deteriorated most rapidly and the tars next, while the fluxed asphalt has held up very well. The naphtha-fluxed binder coat was a help.

In September, 1916, the concrete roadways on the campus at Ames were given a bituminous carpet coat. The same type of liquid asphalt as was used on the experimental gravel road was applied. The work was carried on in practically the same manner, except that the asphalt was heated to about 150° F. before application. The concrete roadways had been treated previously in October, 1913, but the road had worn away so that retreatment was advisable. An application of one-third gallon per square yard restored the roadway to good condition.

CLEANING CATCH BASINS IN FITCHBURG.

During the year 1916 the total number of catch basins in service in connection with the sewer system of Fitchburg, Mass., averaged 956, sixteen having been constructed during the year. There were 1,277 cleanings of basins during the year, or an average of one and one-third times per basin. The average amount of silt removed was 2.16 cu. yds. per basin. The cost of removal was $2.86 per basin, or $1.32 per cu. yd., these costs including the hauling and disposal of the material. Labor was paid 32c. an hour. Disposal of material taken from the catch basins is becoming a more and more difficult problem as the city increases in population.

Figures for the past five years show that the amount removed per basin has varied from a minimum of 1.88 cu. yds. in 1912 to a maximum of 2.48 in 1915; while the cost per basin has varied from a minimum of $2.67 in 1912 to a maximum of $2.99 in 1915; and that the cost per cubic yard removed has varied from a minimum of $1.20 in 1916 to a maximum of $1.42 in 1912. As laborers were paid 25c. an hour in 1912 and 32c. in 1916, it is apparent from these figures that the work was done more economically during the latter year.

TRENTON WATER WORKS NOTES.

In his latest annual report, Alvin Bugbee, superintendent of water works of Trenton, N. J., presents some figures which are very creditable to the operation of that plant. One of the most interesting points brought out was the reduction in consumption which had been effected. The total consumption per day had averaged about 12,000,000 gallons in 1908, and had increased to 22,000,000 gallons in 1913. If a similar increase had been allowed to continue it would have required a new reservoir and new pumps at an early date, at an expenditure of about $1,000,000. The department decided to endeavor to avoid this expenditure by diminishing the consumption. Houses were inspected for leaks, and leaks in mains which did not show on the surface were detected by pitometer tests. In addition, meters were installed where it was believed there was considerable waste. The result of this was a reduction of the consumption from 22,000,000 gallons per day in 1913 to 15,000,000 gallons in 1915, in spite of the additional number of consumers caused by the growth of the city.

The pumping plant spent $800 less for coal in 1916 than in 1915, although pumping 100,000,000 gallons more water, the coal costing the same per ton both years. The high-service station had been operated by gasoline, but when the price of this jumped to 20c. per gallon, costing the plant $350 per month for fuel, they had the gasoline engines changed over to operate as gas engines at a cost of $115 for both engines, thus saving $150 per month in cost of fuel.

The WEEK'S NEWS

A National Highway System Proposed—State Health Legislation in Oklahoma and Indiana—Waterworks Improvements in Los Angeles and New Brunswick—Prescribed Accounts for Utility Companies—New York City's Fire Department—Election Results in Dayton, Petersburg, Va., Columbus and Bridgeport—Garbage Collection and Disposal Changes in Indianapolis, Spokane, New York, Akron and Canton—New York's Traffic Court—Los Angeles Regulates Billboards—Portland, Ore., New Auditorium.

ROADS AND PAVEMENTS

Automobilists Want National Highway System.

Washington, D. C.—"Now that all the states have been equipped with state highway departments and have adopted the policy of building state systems of main, through-line highways—because the Federal Aid Roads Act is on the statute books—every condition is favorable for the next step, the establishment of a National system of highways," predicts chairman George C. Diehl of the good roads board of the American Automobile Association. "The next logical step follows the same course which has been pursued by the state governments; namely, the broadening of federal participation to provide for the establishment of a system of national highways. This policy can be put into effect without disturbance of existing organizations, without providing new means of finance, and with but little change in existing law. The process would logically take a course somewhat as follows: First: The state highway departments and the federal office of public roads would make an initial selection from existing state highway systems of those highways which are of interstate importance. Second: A system thus selected would be approved by Congress, with the requirement that Federal funds be applied only to such system on and after a specified date. Third: The federal aid should be extended to maintenance as well as construction, as the national system of highways should have for all time a close relationship to the federal government. Some of the states have already made plans for utilizing the aid granted by the Federal Aid Road Act on roads which could not properly be included in a national system. But this need not cause extreme conflict, as the federal funds for the first three or four years' operation of the present act could continue to be applied as now planned. The appropriations for the first two years are already available and considerable time necessarily must lapse before the national system could be laid out and made ready for the application of federal funds. In all probability, the new scheme would come into effect as an extension of the present Federal Aid Road Act."

Wins Paving Case in Final Court.

York, Pa.—The state supreme court has refused to allow an appeal to be taken from the superior court's decisions in the contested street paving suits of the city involving East Princess and North Hawthorne streets. The superior court's affirmation of judge Ross' rulings in those cases is therefore final. Speaking of the East Princess street assessments and the contention that the street had been so improved prior to 1914 as to preclude collection of the assessments for paving done in that year, judge Kephart says:

"The work claimed as an original paving was done in 1874 under the authority of council. It consisted of spreading limestone ballast evenly over the roadway, converted into a hard surface by the passing traffic and kept in repair by placing loose stones in the holes or ruts. Without other evidences of intention, this would not be such paving as would exempt the abutting owner from liability for future improvements. Evidence of the same character of work done on other streets would not supply such intention. Indeed it would scarcely be considered as being more than ordinary repairs done to an ordinary dirt road where the traffic is heavy. While due effect must be given to the character of the work done in determining municipal intention, when that work is macadamizing, without other ample evidence it will not be sufficient to show municipal intention. There must be additional evidence of this fact.

"Describing the work as 'macadam' by witnesses or in reports furnishes no information as to the manner of construction and the materials entering into its construction. A witness cannot testify that certain methods of construction were employed to change an ordinary dirt road into a permanently improved highway. This calls for a conclusion. The 'change' called for is expressive of the municipal intention and such intention must be established by evidence apart from the work done."

In the other case, only legal questions were raised, there being no claim that the street had been macadamized prior to the paving in question. The point most strongly urged was that the city should not be permitted to assess the abutting owners for street paving because a number of streets had been paved out of money raised by loan bills and by general taxation. It was argued that unjust discrimination would prevail if the assessment method were permitted by the courts. Judge Kephart says in reply to the argument that a large measure of discretion is vested in the municipal authorities as to the method of payment for street paving, due to the character of the street to be improved, density of traffic and other peculiar local conditions, and that uniformity is arrived at so long as assessments are equitable within the area to be improved. He adds:

"We would not assert that a gross abuse of discretion might not be perpetrated in determining what streets or parts of streets should be paved wholly at the city's expense and what streets should be paved at the expense of the abutting owner. This record does not show any discrimination and if it did and it were of such character that a court could interfere, the complaining parties should have moved to determine that question before the city caused a large expenditure of money to be made on the faith of the ordinances providing the improvement. One cannot stand idly by until the streets are paved and then assert that there has been a gross abuse of discretion."

The superior court also upholds the manner in which the liens had been filed against the property owners and also the plan of issuing improvement bonds resting for their security upon the liens and payable only out of the assessments.

Advertise for a Street Superintendent.

Charlottesville, Va.—This city is determined to have as good a superintendent in charge of street work as it can get and it has advertised over the country for him. City manager Hubert A. Stecker asks for one who has had "experience in street grading and paving work and also in handling men. Man with some engineering training preferred." Charlottesville has 12,000 inhabitants.

SEWERAGE AND SANITATION

State Approves City's Sewer Plans.

Johnstown, Pa.—Revised plans for Johnstown's sanitary sewer system have been approved by the state commissioner of health, the attorney general and the governor. The city is given a permit to carry out the proposed plans. The time for the discharge of untreated sewage from the existing sewer system into state waters is extended to July 1, 1918. Sanitary engineer C. P. Collins executed the plans for the system. Progress is being made on the main line sanitary sewer. The 63-inch concrete pipe is being manufactured in Cambria city. The trench averages 16 feet in depth. The first eight feet of surface is removed with a steam shovel and the remainder with a Moore conveyor. Work was started on June 1. The sewage disposal plant will be constructed about 4,500 feet below Laurel Run. Members of city council, the mayor and others went to West Taylor township recently and looked over the work being

done on the sewer. The matter of handling traffic over the right of way of the sewer was considered. A temporary bridge across Laurel Run will be necessary. The plans approved by the state officials include those for the main collecting and intercepting sewers, the general system of sewage treatment and the scheme of lateral collecting sewers. The permit says: "Nothing in this permit shall be construed as approval of the discharge of untreated sewage into state waters from the proposed comprehensive sewer system. Prior to completion and use of the main collecting sewer, the sub-mains or any lateral sewers, excepting those for which particular authorization of use has been given, the city shall provide works for treatment of the sewage. During construction no radical changes shall be made in the sewer system as herein approved unless the city shall first obtain a permit therefor from the state department of health. The general system of sewage treatment is approved providing the degree of purification effected is at least equivalent to the standards set forth in the permit of April 20, 1915, but it is distinctly stipulated that this approval is conditioned upon the continuous performance of the works in accordance with those standards. Prior to construction of the incinerating plant for destruction of the screenings, the city shall submit general plans in sufficient detail to enable the state to judge of the probable efficiency of operation. Daily records of the operation of the sewage treatment works shall be kept on forms satisfactory to the state department of health and copies thereof shall be filed monthly in the office of said department. These records shall include results of such bacteriological examinations or other tests as the state department of health may deem necessary for the city to make to properly determine and control the operation of the works."

Sanitary Control of Soft Drinks.

Oklahoma City, Okla.—For the protection of the public health the state board of health has issued the following regulation: "Hereafter individual one service drinking cups shall be provided and used in confectioneries and all other places dispensing soft drinks, or other beverages, where such establishments do not maintain and properly use adequate facilities for the sterilization of glasses or other vessels used in dispensing beverages of all kinds. These shall be destroyed immediately after being used to serve a customer. Drinking glasses for beverages at fountains, etc., shall not be used the second time, unless sterilized in the interim."

Power to Wipe Out Insanitary Town.

Taylorville, Ind.—This town, near Terre Haute, long condemned by the state board of health as insanitary and a public nuisance because of the general unhealthful conditions, is the subject of an opinion from attorney-general Stansbury to Dr. J. N, Hurty, state health commissioner. Many months ago Dr. Hurty announced that conditions in Taylorville were so extreme that the state board had decided to step in and attempt to wipe the place out of existence. Stansbury's opinion says that while the state board has power to abate numerous unsanitary and unhealthful conditions in Taylorville—or any other Indiana town—that the plan for abating the nuisance should be left to the "local authorities and their attorneys." Under an act of the 1917 legislature, as pointed out in the opinion, the state board has wide powers to wipe out any public nuisance. Dr. W. H. Roberts, Vigo county health commissioner, has been discharged by the state board because of conditions here.

Weekly Publicity on Milk and Water Supplies

Charleston, W. Va.—A weekly statement on the condition of the milk and water supply of Charleston will be issued in the future by the city health department, according to the announcement by Dr. R. T. Davis, city health commissioner. The following notice has been sent to the different dairies supplying milk and ice cream to the citizens, and they will be forced to comply with these regulations in the future: "Any person or firm selling milk or its products, must cool the milk to a temperature not exceeding 70 degrees, within one hour of milking and bottling and keep the milk cool until delivered to customers. Ice cream makers shall pasteurize all milk and cream used in the manufacture of ice cream. No ice cream shall be re-frozen. Ice cream manufacturers shall obtain milk and cream only from approved milk dealers. Raw milk shall not contain more than 1,000,000 bacteria per c. c. before pasteurization, delivery to customer. Pasteurized milk shall not contain more than 1,000,000 bacteria per c. c. before pasteurization nor more than 25,000 bacteria per c. c. after pasteurization. No milk shall be repasteurized. All places where milk and milk products are produced, sold, stored or handled must be at all times in clean and sanitary condition and screened against flies. Commencing July 16, 1917 a weekly report will be made by the city chemist and the report published in the newspapers, of dealers who do not comply with the above regulations, and repeated violations of the regulations will result in the revocation of the dealers' permit to sell milk or its products. Therefore the health commissioner advises all dairymen and manufacturers to keep their places scrupulously clean and fly-proof."

City Advertises for Health Officer.

Goldsboro, N. C.—This city, which recently went under the manager plan, is now looking all over the country to obtain a capable physician to act as health officer. Goldsboro is a progressive city of 11,000. John R. Crawford, chairman, will receive applications until September 5 from those who are "graduates in medicine and qualified to make approved meat and milk tests." The salary will probably range from $140 to $150 per month.

WATER SUPPLY

Begin Work on Big Reservoir.

Los Angeles, Cal.—Construction work on the Chatsworth reservoir, which will be a storage basin for 9,000,000,000 gallons of aqueduct water, has been begun by the Los Angeles water department. The first test holes for the foundation of the great earthen dam have been driven. The reservoir will involve the construction of four dams, two dykes and the removal of about 1,000,000 cubic yards of earth. The operation of the power plant at full capacity during "peak" hours will be permitted by the construction of the reservoir. It is estimated that the work of building the dam will continue two years. The area of the basin will be 1,300 acres. It will be three miles long and one mile wide.

New Filtration Plant in Service.

New Brunswick, N. J.—One of the most important improvements the city has had under consideration for many years has been completed, the new filtration plant having been put into operation by the New York Continental Jewell Filtration Company, which has finished the construction work. The standpipe, with a capacity of approximately 800,000 gallons, is also completed and in service. With the additional pressure, superintendent of the water department Charles Morris had some fears that it would work havoc with the old water service pipes in the lower section of the city, and accordingly notified all property owners to have any faulty fixtures repaired. The plant was described in full detail in a recent issue of Municipal Journal.

Rates Doubled for Leaky Fixtures.

Danbury, Conn.—The city council and board of aldermen have passed and the mayor has approved an ordinance inflicting a penalty for the existence of water-wasting leaks on premises. According to an advertisement in the newspapers, the ordinance says that the regular rates "shall apply only where the fixtures, piping, faucets, valves and other conduits of water supply shall be maintained in a non-leaking condition, and if upon an inspection of any property the said pipes, valves, etc., are found to be in a leaking condition the rates for the use of water shall be double the amount stipulated for a period of six months. All hat factories shall be provided with suitable shutoffs on all blocking machines (as provided in ordinance) and with gates on the water pipes whereby the water can be shut off during the hours when the making or sizing department is not in operation. Failure to do so on the part of the own-

ers of said factories (to use shutoffs), the rates for the use of water for said factories shall be doubled. The provisions of this ordinance shall not apply to a factory during the noon hour, or to any special pipes in said factories which are carried around to soak tubs, or to any part of said ordinance relating to the use of water meters, or to blocking machines during the months of May, June, July, August and September. No portion of this ordinance shall be construed as applying to pipes maintained for automatic sprinklers."

STREET LIGHTING AND POWER

City Takes Option on Power Site.

Tacoma, Wash.—On recommendation of commissioner Gronen and the city engineer, the council has voted to take an option on Lake Cushman for the purpose of obtaining a power site to add to the present supply of power which is expected to reach its limit by October, 1919. The site is owned by the Mason County Power company, which asks $400,000 for it. The council has voted money for a survey of an additional power site to the Nisqually plant at Mineral. A crew of surveyors and electrical engineers will be sent to Lake Cushman to make a thoro survey and report as soon as possible. Gronen produced a mass of charts and maps to show that the present Nisqually plant's load was increasing at the rate of 10 per cent a year. At the present rate of increase the city plant would be forced to drop some of its larger customers to supply its home consumers. The Mineral lake site will allow the Nisqually plant to operate at full capacity of 24,000 kilowatt the whole year. The Milwaukee railroad has asked for 8,000 kilowatts of power by September and the American Nitrogen Products company at LaGrande has increased its plant and wants 3,000 kilowatts at the same time. The new city car line will use 500 kilowatts. At present the city plant is supplying 12,000 kilowatts daily to the T. R. & P. company and is running at full capacity. The Lake Cushman site will cost $400,000 and if developed to its estimated capacity of 46,000 kilowatts would cost $2,500,000. The power house would be on the shore of Hoods canal near the town of Hoodsport. A transmission line 45 miles long would bring the power to Tacoma.

Utilities Must Follow Commission's Prescribed Accounts.

New York, N. Y.—The system of bookkeeping prescribed by the Public Service Commission must be followed by all of the public utility corporations to the end that the auditing of these accounts by the commission may be quickly performed with very small danger of mistakes. This was the effect of a decision given by the appellate division of the Supreme Court in a certiorari proceeding brought by the Kings County Lighting Company to review a decision of the commission in reference to an issue of bonds. William L. Ransom, chief counsel for the commission, said that the decision would make for sound financing and the proper upkeep of the properties of the corporations. The legal proceedings grew out of the determination of the commission to attach as a condition to an authority given to the Kings County company to issue $134.545.53 in bonds that the money should be used only to make good the indisputable depreciation of the company's property. In sustaining this order the court held that Section 66 of the public service commissions law authorized the commission to prescribe uniform methods of keeping accounts by the gas corporations. The company vigorously objected to the commission dictating the manner in which it should keep track of its own affairs. Another question of importance, which has resulted in much controversy, was answered in the commission's favor. The Kings County and other companies had successfully urged upon the commission that it had no power to deal with the subject of depreciation in a separate proceeding and to require compliance with an order by the commission concerning maintenance expenditures, and depreciation reserves. The commission had yielded in this matter because there appeared to be grave doubts of its power to deal with the matter in an independent proceeding, and had undertaken to deal with it as a Kings County company matter through attaching a condition to an order authorizing an issue of bonds. Concerning this matter the opinion of the court read: "In no event could the commission, without taking an independent proceeding against the relator, in which the relator would have notice and an opportunity to defend itself, make an order requiring it to change its whole system of accounting and put its depreciation charge upon some other basis than that adopted by the company under the law and the earlier order of the commission." Under the commission's order requiring the maintaining of its system of accounts it is required that when fixed capital is retired from service, depreciation applicable to the period after Dec. 31, 1908, was to be charged to the depreciation reserve, and that until otherwise offered the amount estimated to be necessary to cover such depreciation, month by month, was to be based on a rule to be fixed by the commission. The company had set aside an eight-cent rate for each thousand feet of gas sold, to provide for depreciation, and later increased the amount to 11½ cents. It was claimed that part of this reserve had been used for extensions. As to this method, the court said that such a proceeding "would be tantamount to permitting the relator to borrow money for the purpose of providing for a depreciation fund, a practice unsound in principle, and one which would ultimately lead a company into a serious financial condition. The commission therefore was naturally willing only to permit the treasury to be reimbursed by an issue of bonds on condition that such part of the proceeds as were equivalent to the sum spent out of depreciation reserve should be restored, and it coupled its permission with such a condition." The court also decided that the company was entitled to fix such a rule or rate for depreciation as it saw fit, and that this rule was to govern until the commission fixed a different rule or rate, as the commission had the power to do.

To Purchase Gas and Electric Plants.

Oroville, Cal.—The city of Oroville has filed an application with the railroad commission asking the commission to fix and determine the just compensation to be paid the Pacific Gas and Electric Corporation for their gas and electric plants and distributing systems located in Oroville, and an addition known as Oro Vista. The application says that the Pacific Gas and Electric Company claims an interest in the properties formerly, or now, owned by the Oro Electric Corporation, but that it does not know the nature and extent of such interest. The city proposes to purchase the plants at a reasonable value rather than construct a competing system.

Money Refunded on Fast Meters.

Charleston, W. Va.—For what is said to be the first time in the history of West Virginia, gas consumers are being refunded money because gas meters have registered more than they should, according to an announcement made by the public service commission. Out of the 29,000 meters in the state placed in service by chief inspector A. D. Shepperd and his deputies last year, there were 2,916 meters that were more than 2 per cent fast. The amount refunded on these meters by the companies furnishing the gas is announced at $794.43.

FIRE AND POLICE

New York Fire Department Does Well.

New York, N. Y.—According to the annual report of fire commissioner Adamson, the efficiency of the department has increased during the year, and although the fire record of 1916 as a whole was less encouraging than in 1915, when the loss was unusually low, the higher losses were due to the great increase in buildings because of the general prosperity, the storage of munitions, and the growth of the chemical industry. In tenement houses, in which 4,000,000 of the population of the greater city dwell, there were 744 fewer fires than in 1915, a decrease of 40 per cent. Factory fires were 159 fewer, and theatre fires were

reduced one-half. The increase was in ship fires, munition plants, on piers where munitions were stored, and in chemical plants. To meet the emergency caused by the new dangers, commissioner Adamson organized an auxiliary fleet of fireboats, 143 in number, with terminals in strategical points. The total fire loss in New York in 1916 was $8,716,404, while the average loss for the preceding three years, notwithstanding the record of 1915, which was the lowest since the present fire department was organized, was $9,669,461, or nearly a million more than last year's loss. There has been a gratifying development in the employment of preventive measures, and the commissioner in his latest report gives due credit to the uniformed force for its capable co-operation with the regular fire prevention staff. More than 300 firemen have made daily building inspections since 1914. Last year firemen made 1,476,951 inspections; 18,752 orders were issued by the bureau, and 16,531 were complied with. Of the 141 lives lost nearly all were lost in fires due to carelessness. The commissioner says that in no single case was the loss of life due to the construction or design of the building. Because the law does not require fire escapes on private dwellings, thirty-three lives were lost. The largest single cause of fire in 1916 was the careless use of cigars, cigarettes and pipes. The new fire alarm system is already nearly completed, and the commissioner expects that it will still further increase the efficiency of the fire department. The fire department now uses comparatively few horses—it will soon be five-sixths motorized. No fewer than 1,598 members of the force attended the course of practical and theoretical instruction in the fire college. The uniformed force during the year numbered 5,059.

City Awarded Compensation for Electrocuted Fireman.

Shreveport, La.—Through a judgment rendered in the district court by judge Land, based on a point of law sustained by the supreme court in a previous hearing, the city of Shreveport, as subrogee, is awarded a claim of $10,000 against the Southwestern Gas and Electric Company for the death of Clayton Hilburn, a fireman. An appeal was again taken. If the lower court is sustained, Mrs. Willie Hilburn, the fireman's widow, will receive the balance of the judgment after the amount paid her by the city under the compensation law and the expenses of the litigation have been deducted. In February, 1915, Clayton Hilburn, a fireman, was electrocuted while on duty at a fire. Mrs. Hilburn had the choice of alternatives; she could either accept the compensation due her by the city under the employer's liability act or she could file suit against the Southwestern Gas and Electric Company. She chose the former, receiving $2,100 and subrogated her rights of action against the company to the city, which then filed suit to recover $15,000 damages. The question immediately resolved itself into her right to subrogate her claims for damages in a personal injury suit to the city and the district court ruled that she could not. Her attorneys appealed to the supreme court from this decision, the higher court sustained his plea and ordered a new trial.

Lack of Fire Prevention Methods Criticized.

Salem, Ore.—Severe criticisms of Salem's council, fire department, schools, water supply and business institutions are contained in a fire survey report submitted to mayor Keyes by insurance commissioner Wells in the capacity of state fire marshal. "Apparently the outflow is greater than the amount that can be supplied, and this has caused the supply in the reservoir to be depleted to an extent we consider serious from a fire standpoint," says the report in condemning the water supply, and in recommending that a fire reservoir be built, and rigid rules be adopted for lawn sprinkling. The present water supply, the report declares, would not last over six hours in case of a fire. The reservoir for fire purposes should have a capacity of 1,000,000 gallons, it is stated. Referring to the fire department, the report declares: "We find a condition existing here that we do not believe is found in any other city in the United States of its size. The longest ladder in the Salem fire department is 25 feet in length. The fire department would be unable to rescue a person from a third story." Further, it is asserted that when the department responds to fire calls in the residence district the business district is absolutely without protection. After flaying the council for not having enforced an ordinance requiring the city engineer to regulate electric wiring, the report excoriates the school board for lack of fire drills in the schools, and for having shut off the water supply to the school buildings in order to have water rent. "Conditions exist in some business houses which, if not immediately remedied, will result in the destruction of their property, and no doubt cause loss to others who could ill afford the loss," says the report. "In several places the sanitary conditions were unbelievable. The people who conduct their business under such conditions are a detriment to any community, and we hope that our little advice to them will be the means of eliminating the fire hazard and improving the sanitary conditions. In two cases, however, we fear we will have to apply the law with its fine of not more than $50 a day." Commenting on the disposition of the business men, the report declares that some were found "who were against everything," and that "one man was even angry because business was good."

GOVERNMENT AND FINANCE

City Manager Plan Center of Dayton Primaries.

Dayton, O.—An interesting primary election has been held here which drew widespread attention from all over the country because the city manager plan was involved. The present commissioners ran for re-nomination on a non-partisan ticket. While declaring themselves in favor of the non-partisan principle and the manager plan, the Democrats put up their own ticket. They were charged with desire to gain control of the city administration for political purposes. The Socialists ran a complete ticket, and there were four independents. Six were to be elected. The election resulted in the nomination of the three Socialists and the present incumbents, the Socialists getting the highest vote. Willard Barringer, Socialist, received 11,017 votes, while the highest non-partisan, commissioner Jesse M. Switzer, polled 7,314 and George P. Huffman, Democrat, polled 3,883. The average non-partisan vote was 6,849, the average Democratic vote was 3,355 and the average Socialist vote was 9,721.

Millions Added to Tax Valuations.

Indianapolis, Ind.—Total increases of $10,963,461 in corporation values for taxation in Marion, Lake, Lawrence and St. Joseph counties were made by the state board of tax commissioners as the result of appeals taken from the amounts fixed by the county boards of review. The decisions of the state board are victories in particular for Leo Fesler, Marion county auditor, who appealed from the Marion county board of review in regard to the valuation of the public service corporations on the ground that the amounts fixed were inequitable and too low, and for citizens of East Chicago, who asked the state board for more equitable valuations on large private corporations there. Last year, after county auditor Fesler had made an appeal to the state board in regard to the valuation of $4,011,500 on the property of the Indianapolis Water Company by the county board of review, the state board raised the total valuation to $5,786,383. The valuation this year is an increase of $105,071 over the amount fixed last year. The state board also approved a horizontal increase of from 3 to 10 per cent on the personal property valuations in certain counties. This increase amounted to 3 per cent in Union county; 5 per cent in Adams, Jasper, Montgomery, Perry, Pulaski, Scott, Starke, Sullivan and Warren counties, and 10 per cent in Vermilion county. Whitley county received a horizontal reduction of 10 per cent. The total increase in Marion county fixed by the state board in advance of the amounts fixed by the county board of review is $4,164,942. The increases in East Chicago amount to $3,781,595; in Gary, where the valuation of the Indiana Steel Company was made the same as last year, $1,029,200; in St. Joseph county, $1,911,485, and Lawrence county, where there are valuable creosoting plants, $76,239. The total amount of corporation valuations made by county boards of review and the state board is greatly in excess of the

total of last year. In some instances the state board made further raises in the estimates after the county boards of review had made increases over last year. The total horizontal increase in the state, due to the board's arbitrarily adding percentages of increase to each of eleven counties, amounted to $1,854,536. One county, Whitley, was reduced 10 per cent in its total valuation and this resulted in a decrease of $526,145. Thus the net increase by reason of the board's horizontal increases and decreases in the state amounted to $1,328,391. The board's instructions resulted in the general average valuation of personal property for taxation purposes being 75 per cent of "true cash value" throughout the state, according to its announcement. In the final recapitulation of its figures the board showed that the total valuation for taxation purposes of all personal property in the state amounted to approximately $541,475,074, or a gain of about $45,076,169 over last year. The board's increases in valuations of corporate property totaled $10,963,461, and the board's net increase for this year on the classes of corporate inter-county property valued originally by the board brings up the total increase in personal property and additional improvements to property which came before the state board on appeals and the corporate property valued originally by the board at its first session to approximately $58,878,857. This is the total increase of valuations for tax purposes made by township assessors, county boards of review and the state board of tax commissioners. It does not include, of course, the values of additional improvements to property in those counties, from which appeals were not sent in to the state board and it does not include the increase in values of real estate. Real estate is not valued this year for taxation purposes, the values being placed on that class of property once in four years, under the Indiana statutes. The board made public also a comparative statement of the average valuation of horses, cattle, hogs, sheep, automobiles, farm implements and household goods, made in each county of the state, the figures being given for this year and last year. They follow:

Class of property.	Valued 1917.	Valued 1916.
Horses and mules	$73.50 a head	$70.10 a head
Cattle	30.50 a head	27.40 a head
Hogs (all sizes)	8.80 a head	6.10 a head
Sheep	6.50 a head	4.50 a head
Automobiles	205.90 each	211.50 each
Farm implements (per farm)	45.70	41.40
Household goods (per home)	41.90	39.20

The board also announced that its tabulations show that the general average valuation in all counties of money and bonds, notes and mortgages, banks and trust companies, and merchandise, was 75 per cent of "true cash value."

Vote for City Manager Plan.

Petersburg, Va.—This city has decided for the city manager plan of government. The vote at a special election six people in Petersburg, therefore, condemned the old, confused, indirect mayor and bicameral council system, which they considered old and confused.

Municipal Woman Suffrage in Columbus.

Columbus, O.—Municipal suffrage carried here by a majority of 935 votes. The total vote was 8,637 for suffrage and 7,702 against. Women of Columbus will be allowed the right to vote at the next November election. East Cleveland is the only other city in Ohio granting the right to vote to women on municipal issues. Voters at the election also approved a $50,000 bond issue for paving Columbus streets.

City Manager Plan Defeated.

Bridgeport, Conn.—Displaying slight interest, but with a decided opposition, 4,470 voters out of the city's registration of 21,687, defeated the proposed city manager charter, which it is believed will be received as a final repulse for any propositions pertaining to a change in the city's government. It was beaten more than three to one. Of the handful voting, 931 indicated that they favored the charter, while 2,898 voted "no" and 650 entered the polls, but failed to signify their choices, their votes being wasted. The defeat of the proposal is ascribed to the small vote, the indifference of the voters and the determination of the opposition. Many who declared themselves in favor of the city manager principle picked flaws in the proposed charter. At a previous election the commision form of government was defeated by lack of a sufficient vote. This time the plan received the endorsement of mayor Clifford B. Wilson. The initiative, referendum and recall were in this charter.

STREET CLEANING AND REFUSE DISPOSAL

Conservation Results in Garbage Collection Drop.

Bridgeport, Conn.—The conservation movement has had an appreciable effect on the collection of garbage in this city, according to a recent statement by health officer Walter H. Brown. During the month of June 3,114,600 pounds of garbage were collected. This is 114,490 pounds less than the total amount taken in June, 1916, when the city collectors gathered 3,229,090 pounds of refuse. It is thought that the urgings of the Fairfield County Association for the Mobilization of Resources relative to careful separation of garbage has been the principal factor in bringing down the total. In addition nearly 40 per cent of the refuse collected during the last month has been foreign matter such as rags, bottles, tin cans, crockery and fruit baskets. This amount, subtracted from the whole would show a large difference in the amounts collected in June this year and June a year ago. The health officers are busily engaged in warning against the practice of throwing such things as bottles, crockery and tin cans in the garbage. There is a city ordinance providing a heavy penalty for those who violate this ruling. One of the huge digestors at the garbage plant was recently rendered useless because of rubbish. One of the health department inspectors accompanied the garbage wagon about the city noting the neighborhood and houses that are most flagrant in their breach of the city ordinance.

Will Not Get Alcohol From Garbage.

Columbus, O.—Because of the uncertainty of prices for alcohol after the war, council recently decided not to invest $35,000 in a plant to render alcohol from garbage, as already described in Municipal Journal. Charles P. Hoover, chemist at the filtration plant, and Thomas D. Banks, superintendent of the garbage reduction plant, after testing the process of Dr. Morgan of Chicago, for more than a year, reported that a good profit could be made from the product at present war prices, but at normal prices paid for alcohol, the profit would be slight. There are to be no further experiments along these lines.

Improve Specifications for Refuse Collection.

Indianapolis, Ind.—Extensive changes in the method of disposing of refuse of every sort in Indianapolis are contained in specifications adopted by the Board of Public Works. The specifications, prepared by B. J. T. Jeup, city engineer, provide for the hauling and disposal of all garbage, ashes and household refuse for a period of five years dating from January 1, 1918. The board will receive bids September 5, and the contract would become effective next year in May, when the present contract with the Indianapolis Reduction Company for garbage disposal expires, and in October of next year when the contract for the hauling of ashes and paper held by the Indianapolis Hauling Company expires. Garbage, dead animals, ashes and household sweepings are disposed of at the present time under two contracts. The specifications just adopted provide that all this waste material would be hauled to Seller's farm under one contract. The Indianapolis sanitary commission, which was created by an act passed by the last general assembly, will have control of the disposal of garbage and ashes, but the department of public works, under the provisions of that act, will have charge of the hauling of the waste products of Seller's farm, where the commission intends to erect a reduction plant and an incinerator to dispose of all refuse from private property. Mr. Jeup said each bidder would be required to submit bids providing several methods for paying for the hauling of waste products, and he said the proposition that would prove the most advantageous to the city would be accepted.

One bid will be an offer of a lump sum for hauling the debris to Seller's farm. Another bid would provide for the naming of a sum per acre of annexed territory for the hauling of debris. Another bid would be based on the net tonnage of material hauled. Bidders will be required to submit proposals for hauling the debris for a five-year period dating from January 1, 1919, and also for hauling the debris during periods of 1918 until January 1, 1919, after the present contracts expire. The board of public works reserves the right under the terms of the specifications to require each bidder to make known the names of the men interested in the bidding company in order that the board may determine whether or not the bidders are trustworthy. The city council would be required to ratify the contract. The contractor would be required to give bond in the sum of $50,000 to guarantee the fulfillment of his contract and would be required to have an office near the city hall and to call at the office of the Board of Public Works daily to receive instructions or complaints about service. Mr. Jeup expressed the belief that if a contract is signed based on the specifications that have been prepared, ample facilities will be provided for hauling away all waste products from the homes, apartment houses, hotels, commission houses, school buildings and business places of the city. The contract of the Indianapolis Hauling Company, which now is in force, limits the classes of waste products that are to be hauled to tin cans, waste paper and household sweepings. The word "sweepings" in the new specifications embodies the following: Sweepings, paper, cans, bottles, wall paper, fabrics, shoes, discarded tinware, iron, sheet metal, grass, weeds, leaves, tree trimmings, dead trees, brush, vines, flowers, wornout furniture, excelsior, dead animals and ashes. The specifications do not include street sweepings. Mr. Jeup said as many types of waste products have been included in the specifications as possible, in order that householders would not be required to hire teamsters to carry away debris from their premises. The promiscuous hauling of such debris has resulted in promiscuous dumping in many parts of the city, and Mr. Jeup hopes that the next contract will eliminate these difficulties.

New Crematory in Service.

Spokane, Wash.—The city's new crematory, under construction for some time, is now in operation. Superintendent Arthur Peterson is in charge. The new plant is said to represent the last word in crematory construction and is equipped with garages, stables and machine and blacksmith shops of brick and concrete fireproof construction. The tallest concrete stack in the city, 207 feet high, is part of the plant. Parking of the grounds, originally planned for this year, will be postponed until the spring of 1918, because of the lateness of the season.

Big Garbage Plant Completed.

New York, N. Y.—The new $2,500,000 garbage disposal plant of the Metropolitan By-Products Company, on Arthur Kills, Staten Island, is now completed and has been visited by many operators from all over the country wishing to see the practical demonstration of the quick and odorless process employed there. All the plants, with the exception of one at New Bedford, Mass., represented by the visitors, use the old type system similar to that of Barren Island, which requires seventeen different operations to accomplish what it is claimed the new system will do in three—these being closed-in and automatic. The Staten Island plant has a capacity for the reduction of 2,000 tons of garbage a day and is the largest garbage reduction plant in the world. The testing-out process of the machinery had proceeded to about 70 per cent and many units were in complete operation when the visitors arrived. Irwin T. Osborne, a garbage expert formerly employed by the city, explained the technical features of the new system. Raymond Wells, the inventor of the system known as the "Cobwell process," was also present. The party was conducted by F. D. Clark of the American Reduction Company of Pittsburgh, Pa., in company with ex-Senator Flinn of Pittsburgh. The new building is constructed of steel, stone, concrete and glass and is designed for absolutely sanitary operation. It is claimed that with its simple and perfected system it is physically impossible for objectionable odors to escape and pollute the atmosphere. The plant will give employment to hundreds of Staten Islanders on a payroll of $6,000 a week, or $300,000 a year, and disburse upward of $1,000,000 a year locally for supplies. A large dormitory and office building have been constructed by the company near the plant, the one to accommodate the clerical force, timekeepers and foremen, and the other to supply offices and sleeping quarters for the engineers and official staff. Both these buildings are equipped and furnished in modern style. The housing of the families of the main laboring force—totaling possibly from 1,200 to 1,500 persons—will be provided for by an independent operation under conditions prescribed by the Metropolitan By-Products Company so as to insure for its employees wholesome, sanitary living conditions. This operation will be conducted by the Weymar Lumber Company, which purchased forty acres of its land in a wooded tract several hundred yards east of the garbage plant on which to establish a labor colony drawing its patronage from the garbage plant and other factories in the vicinity.

Garbage Plant Turned Over to Soap Company.

Akron, O.—Inability to increase the efficiency of the garbage collection is said by supervisor of garbage collection D. R. Thomas to have been the cause of the resignation of Geo. A. Reynolds, manager of the garbage collection. Reynolds says the job of getting help was more than he could handle in Akron. He had been given free hand in the entire collection, but was unable to keep up with the demands on account of the lack of help. Ever since the plant was turned over recently to the Akron Soap Co., and D. R. Thomas was made supervisor of the collection, he says he has been in a position to insist on a 48-hour collection of garbage on complaints. Reynolds, he charges, has been unable to comply. A forfeit of a bond of $15,000 would fall if the soap company did not collect the garbage satisfactorily, according to the terms of the contract. Thomas promises that the teams will soon be routed so as to determine just where they should collect any one day. Next year, he says, when the railway loading station is finished and the long haul to the plant is eliminated, the collection will be twice weekly. The garbage situation in Akron has been a source of difficulty to citizens and city officials for some months, garbage remaining uncollected for several days during hot weather. The long haul of several miles to the garbage plant has caused much trouble. When Thomas was appointed supervisor, $21,000 was appropriated to pay for collection and $1,520 for personal services.

City Takes Over Garbage Collection.

Canton, O.—Superintendent Krumlauf is gradually getting the garbage collection situation under control and by working overtime has about caught up with the needs of the city. The officials were greatly handicapped when the city took over the collection system of the Sanitary Garbage company a few weeks ago. Collections were then three weeks behind, the company officials did not co-operate with the city and most of the collectors quit work. Superintendent Krumlauf has therefore had to build up a new organization and establish a new system. Following repeated failure by the collection company to fulfil its contract and innumerable complaints of bad service, the city decided to take over the collection system. The city retained R. Winthrop Pratt, of Cleveland, as consulting engineer to investigate and he reported that equipment necessary for the city to give adequate collection service would cost $17,500 and hauling would amount to $16,500 a year. With free collection it was estimated that the amount of garbage collected would total 19½ tons per day in winter and 37 tons in summer. After bickering, the council passed an ordinance without the approval of mayor Stolberg, paying the collection company $1,760 for wagons and tanks, and authorizing service director Starrett to secure additional equipment. Henry Krumlauf, superintendent of sewers and the sewage disposal plant, was appointed superintendent of collection at a salary of $1,500. A new reduction plant was completed by the Canton Fertilizer and Chemical company northeast of

the city, and the city is hauling the garbage to the new works. The old disposal plant will be in operation one day each week for the burning of rubbish and papers. The contract between the city and fertilizer plant does not allow the delivery of anything but reducible garbage to the plant. A straight rate of 40 cents per month, payable in advance, is being charged by the city for the collection of garbage from residences. Any person not paying promptly will not be given service, it is stated. The hotels and restaurants will have to furnish their own cans and will be charged at a rate of six cents per can. The citizens will have to furnish their own cans later when the city installs the tank wagon collection. Free collection of the garbage is planned to be started about January 1. The present profits will be used to buy additional wagons and cans.

TRAFFIC AND TRANSPORTATION

Utility Board Upheld in Fare Decision.

Trenton, N. J.—An order of the Board of Public Utility Commissioners restraining the Trenton & Mercer County Traction Corporation from putting into effect the proposed withdrawal of the sale of six tickets for a quarter on its lines in this city and suburban sections has been affirmed by the supreme court in an opinion handed down by Justice Swayze. In deciding the appeal of the traction company the court held it was clear that the utilities commission had jurisdiction under the section of the act involving supposed increase in rates. The court found it unnecessary to pass upon the question whether the original ordinances of the city of Trenton and their acceptance amounted to a contract by which the company was forbidden to charge more than five cents. It was also unnecessary, in the view of the court, to consider whether a fare of four and one-sixth cents is reasonable in view of the present condition and the situation of the company.

Tunnel Contractor Sues, Charges Misinformation.

Boston, Mass.—Because of the character of the soil encountered in digging the tunnel under Fort Point channel the contractor, Patrick McGovern & Co., has brought suit in the Supreme Court for extra pay from the city of about $250,000. The contention is made by the contractors that the transit commission concealed information in its possession by indicating in the plans that what proved to be rock was only hardpan. Consequently the contractor based his proposal on the presumption that it was hardpan, whereas he would have placed a higher figure on the work if he had known that it was rock. An offer is made to return to the city the $2,250,000 already paid in order that the contract terms may be revised and the contractor be paid on the basis of what he has done. It is denied by the city that the transit commission concealed any information, and that the information given by the commission was anything more than an expression of opinion. Moreover, the city contends that it cannot be held liable for the action of the commission, as the supreme court has decided that the commissioners are public officers and not servants of the city.

The New York Traffic Court.

New York, N. Y.—Magistrate Frederick B. House of the traffic court has given out a report on the work in his court from its opening on June 14, 1916, to Dec. 29, 1916. The report contends that pedestrians have a right to demand the regulation of traffic because the lives of 3,500,000 persons are put in peril by reckless driving and speeding through the city streets, while only 350,000 use automobiles daily. Successful use of the summons is emphasized. Of 7,365 defendants only 32 were placed under summary arrest. There were 6,451 pleas of guilty, and 885 pleas of not guilty, while only 29 failed to appear for examination and have never been apprehended. A total of $103,609 was collected in fines, and 779 persons were sent to prison, but 485 of this number eventually paid their fines. Only 117 were sent to prison without the alternative of a fine. The total number of speed cases was 2,746. Of these 22 were second offenders and 23 had been brought into court before. The licenses of 11 of the third offenders were revoked, and 12 paid fines of $100. Most of the speed violations were on Fifth avenue and Riverside drive.

High Street Car Record Despite War.

Liverpool, England.—The report of the Liverpool Tramways for the past year is especially interesting. The striking features are that 13,500,000 more passengers were carried in 1916 than in the previous record year, which was the year before the war, and that even with the enormous traffic handled, not one serious accident occurred. This successful operation of the tramway system was conducted by a staff which, to a large extent, was new to the work; that is, by men incapable of military service, and, very largely, by women. In the industrial portions of Liverpool the cost of travel was 2 cents per 3 miles and 207 yards at all periods of the day, against an average for the 72 municipal tramways of the Kingdom of 2 cents per 1 mile and 685 yards. Even with concessions in some towns to workingmen for a limited number of hours, the fares in many cases were not as low as those given to the whole community of Liverpool. The increase in the traffic receipts during the year was $201,609. The average earnings per car-mile were $0.2824 against $0.2670 for 1915.

MISCELLANEOUS

Billboard Regulation in Los Angeles.

Los Angeles, Cal.—The city council has passed a measure regulating billboards in the city. The chief provisions of the legislation are as follows: 1. The existing billboard ordinance affecting the height, construction, etc., of billboards was re-enacted. 2. A central business district is established within which no other restrictions than those contained in the present ordinance are enforced. 3. A semi-business district defined as any block wherein more than 50% of the occupied frontage is occupied by buildings utilized for business purposes, is established, within which no billboard larger than 12 square feet (for instance 3 x 4 feet) is permitted except upon the written consent of 51% of the property frontage in such block. Furthermore, no billboard more than 12 square feet, without such consent, can be established within 15 feet of another billboard. 4. A suburban district is established, defined as "all portions of the city whch are not divided or subdivided into lots of 100 feet or less frontage on any public thoroughfare" within which there is no new restriction upon billboards, except that they must be at least 50 feet from any residence building. 5. The residence district established by the ordinance is defined as all portions of the city not included within the business, semi-business or suburban district, and in this district no billboards greater than 12 square feet are permitted with or without the consent of the property owners. 6. As to the establishment of new billboards the provisions of the ordinance take effect immediately, but with respect to existing billboards 12 months from the date of passage of the ordinance is given, during which time adjustment may be made. 7. No billboard in any section of the city may be installed or maintained within 50 feet of any building used exclusively for residence purposes.

Municipal Auditorium Opened.

Portland, Ore.—Portland's $600,000 public auditorium, which has been formally dedicated with appropriate exercises, covers an entire block of ground. It is a massive structure of steel construction, classic in design and with fine outlines and color scheme. It was designed to fill a long felt want and it will be utilized for many civic functions from a small gathering in one of the lesser assembly halls to a great mechanics' fair, an immense operatic production, a music festival or a national convention. It is of the opera house type of building, the main auditorium being constructed as a great theater with a seating capacity of 3,527. There is a stage, 45 feet wide and 82 feet long, perhaps the largest stage on the Pacific Coast. It is equipped with all modern accessories, including 16 dressing rooms, property rooms, a big male chorus dressing room and a rehearsal room. On each side of the main floor there are assembly halls for chamber concerts or small gatherings, 40 feet wide and 137 feet long, which can be thrown open by removable partitions into the main auditorium, increasing the seating capacity of the auditorium

to a maximum capacity of 5,500. There are no columns in the way to obstruct a view of the stage at any point.

As accessories to the auditorium there are men's and women's dressing rooms, cloak rooms, smoking rooms, reception halls and offices for the manager. The foyer is roomy. Cushioned opera chairs are on the main floor and hard-seated opera chairs are in the balcony and upper galleries. The chairs on the lower floor are so designed that they are easily removed to make place for the flat removable floor which has been constructed at a cost of $26,000. This floor can be placed at an expense of $700 at any time when it is desired to use the main auditorium for balls or manufacturers' fairs or any other such purpose. This floor runs on a level with the stage. One of the biggest features of the auditorium is the great pipe organ being installed at a cost of $25,000. In connection with the small assembly hall on the south side of the building there is a large kitchen and accessory attachments from which banquets may be served.

On the second and third floors on the south side there are a succession of rooms which will be occupied by the Oregon Historical Society. These rooms are especially arranged for the museum and the historical library of this organization. In connection with it are reception rooms and offices for the officers of the society. On the north side of the building there is another immense room on the second floor which can be used for art exhibits or for the city free museum. Another exhibit room may be utilized for art exhibits. In the basement on the north side are located public comfort stations and shower baths for men and women. They will be open constantly for the benefit of the public. There is also in the basement an immense exhibit room, 114 feet wide and 168 feet long, for automobile shows, land product or manufacturers' shows. There are quarters for janitors and rooms for the storage of equipment and supplies. One of the most modern heating systems in any building in the city supplies the structure with heat and ventilation.

Need for this building was seen after the Lewis and Clark exposition. Portland had no building suitable for housing conventions or big operatic productions or music festivals. After much planning, a charter amendment was submitted to the voters in 1911, providing for a bond issue of $600,000 for the construction of an auditorium, and this amendment was carried by a substantial majority. Fifteen days after the bond issue carried the auditorium commission, consisting of T. B. Wilcox, W. D. Fenton, Hugh Hume, Dr. J. R. Weatherbee and Phil Metschan, Jr., was appointed by Mayor Joseph Simon. Ellis F. Lawrence was named advisory architect for the commission and he prepared a tentative program. The auditorium bill provided that plans should be in accordance with the rules of the American Institute of Architects, and accordingly Willis Polk, of San Francisco; Kirk K. Cutter, of Spokane, and Ellis F. Lawrence were named a committee of awards. Plans were then submitted and those of J. H. Freedlander and A. D. Seymour, of New York, were accepted. These plans provided for a building larger than could be placed on one block and the auditorium commission then proposed an additional bond issue of $250,000 to purchase land adjacent to the Market block or some other site. This bond issue was rejected by the voters and the commission had on its hands plans for a building larger than could be erected on the market block, and with no funds to purchase additional ground. The matter was then held in abeyance until the commission form of government went into effect. Mayor Albee assigned the task of unraveling the tangle to commissioner William L. Brewster, and after much investigation and agitation, it finally was decided to place the building on the Market block. In the meantime the question arose as to the right of the city to use the Market block for an auditorium, as the land originally was deeded to the city for public market purposes. A suit was brought and the state supreme court finally decided that the right of the city to utilize the Market block for any purpose it desires was supreme. Architects Freedlander and Seymour were ordered to prepare revised plans for the building on the Market block. The contract for the structure was awarded to Hans Pedersen in February, 1916, and soon afterward the breaking of the ground for the building took place. Trouble with the contractor followed, but the work proceeded to such a stage that the cornerstone was laid in September, 1916. There is still much work to be done on the structure before it is finally accepted by the city. It will not be fully completed for a month, but while the work is progressing it can be utilized for many public functions.

Building Municipal Coal Docks.

St. Paul, Minn.—Work on St. Paul's new municipal coal docks on the upper levee is well under way. It is the plan of the engineering department to speed the job, so there may be no unnecessary delay in putting the unloading apparatus in action. The government must do some dredging before the new unloading platform will be available. Meanwhile officials of the city, the companies concerned and the St. Paul Association have confirmed plans for establishing ore docks on the bridge of the St. Paul Bridge Terminal company, a project which will result in hundreds of tons of ore from the Minnesota range districts being shipped from St. Paul to St. Louis by boat on the Mississippi river. The plans have been approved by the city council and appropriation made to carry out the work. They form one of the biggest recent steps toward reviving river traffic. According to the plans, chutes will be constructed from the floor of the draw span, adjoining the center pier of the bridge. Cars of ore will be dumped into boats from the chutes. A large percentage of the ore will be shipped to St. Paul by rail, taken to the ore docks at the terminal bridge between here and South St. Paul, loaded into the boats and shipped to St. Louis and other ports down the river. L. P. Wolff, engineer, and J. W. Pearson, secretary of the South St. Paul Union Stockyards company, representing the bridge corporation; assistant city engineer Gutbac, H. E. Stevens, bridge engineer of the Great Northern railway, and E. B. Norris, industrial commissioner of public affairs of the St. Paul Association took part in the agreement. The bridge was given for the purpose by the terminal company officials in an effort to aid the city in reviving river traffic, with no remuneration. According to the plans, the city will have to pay for installing the chutes and other necessary improvements, which, in the opinion of the engineers, will amount to little.

LEGAL NOTES

A Summary and Notes of Recent Decisions—Rulings of Interest to Municipalities

Owner of Lot—Fee in Street.

(N. D.) In this state an abutting lot owner owns the fee to one-half of the street.—Gram Const. Co. v. Minneapolis, St. P. & S. S. M. Ry. Co., 161 N. W., 732.

Breach of Contractor's Agreement.

(Or.) Where contractor for street improvements undertook to make all payments to laborers or materialmen, his failure to pay for materials held breach of conditions of contract and bond, for which contractor's sureties were liable.—Bay City v. Sandberg, 163 P. 444.

Unjust Assessment.

(Ill.) Where the court, on objection that assessment for sewer construction was inequitable, found it to be so, it could not dismiss petition for such inequitable apportionment between the public and property owners, but it should have changed the assessment.—Village of Bradley v. New York Cent. R. Co., 115 N. E. 640.

Surety on Bond—Liability.

(U. S. C. C. A.) A surety on the bond given by a paving contractor cannot, if the contract was invalid because in excess of the mayor's authority, be held liable for the contractor's failure to conform to the specifications.—City of Hutchinson v. Kansas Bitulithic Co., 239 F. 659.

Sewer Contract—Estimates.

(Mich.) A sewer construction contract provision that all estimates should be made by city engineer and should be final and conclusive between the parties was valid.—Schneider v. City of Ann Arbor, 162 N. W. 110.

Sidewalks—Construction and Assessment.

(Iowa) Where city ordered construction of sidewalks, and assessed cost for sidewalk abutting a quarter section, which had been platted into city lots, against the quarter section and not the several lots which were owned by various persons, the assessment could not be canceled as to one lot owner and sustained as to another, where both were equally liable.—Cavanagh v. City of Des Moines, 162 N. W. 17.

NEWS OF THE SOCIETIES

Calendar of Meetings.

Aug. 21-23.—NEW YORK STATE FIREMEN'S CONVENTION. Flushing, N. Y. Secretary, Thos. Honohan, Frankfort, N. Y.

Aug. 27-29.—UNION OF CANADIAN MUNICIPALITIES. Annual convention, London, Ont. Secretary, W. D. Lighthall, K. C., Westmount, Que.

Aug. 28-30.—PENNSYLVANIA LEAGUE OF THIRD CLASS CITIES. Annual convention, Harrisburg, Pa.

Aug. 29-31.—UNION OF NOVA SCOTIA MUNICIPALITIES. Annual convention, Truro, N. S. Secretary, Arthur Roberts, Bridgewater, N. S.

Aug. 29-31.—ONTARIO MUNICIPAL ASSOCIATION. Annual convention, Toronto, Ont. Secretary, B. H. Spence, 705 Lumsden building, Toronto, Ont.

Sept. 10-12.—AMERICAN CHEMICAL SOCIETY. Fifty-fifth annual convention, Boston, Mass.

Sept. 10-15.—NATIONAL EXPOSITION OF SAFETY AND SANITATION. Annual conference, New York, N. Y. Secretary, W. C. Cameron, Continental and Commercial Bank building, Chicago, Ill.

Sept. 11-13.—AMERICAN ASSOCIATION OF PARK SUPERINTENDENTS. Annual convention, St. Louis, Mo. Secretary, Roland W. Cotterill, 533 City Hall, Seattle, Wash.

Sept. 11-14.—INTERNATIONAL ASSOCIATION OF MUNICIPAL ELECTRICIANS. Annual convention, Niagara Falls, N. Y. Secretary, Clarence R. George, Houston, Tex.

Sept. 11-14.—NEW ENGLAND WATER-WORKS ASSOCIATION. Annual convention, Hartford, Conn. Secretary, Willard Kent, 715 Tremont Temple, Boston, Mass.

Sept. 18-20.—LEAGUE OF IOWA MUNICIPALITIES. Annual convention, Iowa City. Secretary, Frank G. Pierce, Marshalltown, Ia.

Sept. 18-20.—LEAGUE OF VIRGINIA MUNICIPALITIES. Annual convention, Lynchburg, Va. Secretary, L. C. Brinton, Portsmouth, Va.

Sept. 24-29.—LEAGUE OF CALIFORNIA MUNICIPALITIES. Annual convention, Santa Rosa, Cal. Secretary, Wm. J. Locke, Pacific Building, San Francisco, Cal.

Sept. 24-29.—THIRD NATIONAL EXPOSITION OF CHEMICAL INDUSTRIES. Exposition, Grand Central Palace, New York City.

Sept. 25-27.—SMOKE PREVENTION ASSOCIATION. Annual convention, Columbus, O. Secretary, Frank A. Chambers, City Hall, Chicago, Ill.

Sept. 27-29.—AMERICAN AND CANADIAN ENGINEERS AND ARCHITECTS OF NORWEGIAN BIRTH OR DESCENT. Informal congress and re-union, Chicago Norske Klub, Chicago, Ill. Chairman, Committee on Arrangements, Joachim G. Glaver, consulting engineer, Chicago, Ill.

Oct. 9-12.—LEAGUE OF KANSAS MUNICIPALITIES. Annual convention, Wichita, Kan. Secretary, C. H. Talbot, University of Kansas, Lawrence, Kan.

Oct. 15-17.—NATIONAL HOUSING ASSOCIATION. Annual conference, Hotel La Salle, Chicago, Ill. Secretary, Lawrence Veiller, 105 East 22d St., New York City.

Oct. 17-18.—LEAGUE OF MINNESOTA MUNICIPALITIES. Fifth annual convention, St. Cloud, Minn. Secretary-treasurer, Richard R. Price, University of Minnesota, Minneapolis.

Oct. 22-24.—AMERICAN CIVIC ASSOCIATION. Annual meeting, St. Louis, Mo. Secretary, Richard B. Watrous, 914 Union Trust building, Washington, D. C.

Nov. 19-24.—CITY MANAGERS' ASSOCIATION. Annual meeting, Detroit, Mich. Secretary, W. L. Miller, City Manager, St. Augustine, Fla.

Nov. 20-23.—PLAYGROUND AND RECREATION ASSOCIATION OF AMERICA. Recreation Congress, Milwaukee, Wis. Secretary, H. S. Braucher, 1 Madison Ave., New York, N. Y.

Nov. 21-24.—NATIONAL MUNICIPAL LEAGUE. Twenty-third annual meeting, Hotel Statler, Detroit, Mich. Secretary, Clinton Rogers Woodruff, 703 North American Bldg., Philadelphia, Pa.

American Chemical Society.

Chemical engineers and manufacturers from all over the United States will gather in Boston on September 10, 11, 12, to participate in the fifty-fifth annual convention of the American Chemical Society. It is estimated that over a thousand will be present for the event, in spite of the fact that many will be compelled to remain at home on account of war orders and the development of war time plans and experiments. It was intended that the convention would occupy the entire second week of September, but it has been determined on account of the serious times and the mobilization of militia during that month, that it will be the better plan to eliminate such features of the convention as the big banquet and other entertainments, excepting that a typical New England shore dinner will be given and a smoker will give the desirable touch of good-fellowship to the event.

This convention will have an especially important significance in New England, as it will bring many chemical engineers and experts to this locality for the first time since the present great development of the chemical business in the United States, as a result of the cutting off of imports of chemicals and dyes from Germany and other foreign countries since the declaration of war in 1914. The rise of the chemical industry to its present important place in our manufacturing has placed the chemists themselves in the foreground of modern industrial activity, and the Government's recognition of their importance in modern warfare has brought about the mobilization of the chemical engineers and manufacturers throughout the entire country. There are about 30,000 engineers and chemists who have been so mobilized and in these days of such enormous problems as the use of a million pounds of explosives in one operation, the public is beginning to recognize the advance of the industry. The convention will undoubtedly bring to light some of the results of recent research and many experts and engineers who hold prominent positions in the advance of industry will be speakers at the various meetings.

National Safety Council.

In view of the changed conditions that are being brought about in numerous factories by the national draft, the matter of safety of employees, especially novices who are to take the places of those who enlist, has become a national problem of considerable importance, and with this idea foremost in mind, a Safety and Sanitation Congress has been called to take place in New York City, September 10-15. It will be the largest congress of this nature ever held and delegates from all over the world will attend to discuss matters pertaining to the promotion and standardization of safety methods in factories, railroads, and the various industries in which hazardous occupations are found.

Coincident with the Congress there will be staged the Safety and Sanitation Exposition, three large floors of the Grand Central Palace being used for this. The National Safety Council and the American Museum of Safety will co-operate in this. Thousands of safety devices and demonstrations of accident prevention will be on view. The exposition will be open to the public for one week, and it is expected that it will result in at least a thousand new members being enrolled who will promise to conform to standards urged by the council.

Victory for the allies is more dependent on safety among our various industries than the average person imagines. Not only is this true of munition plants where many bad explosions have occured, either through lack of pre-

(Continued on page 190)

PERSONALS

Adams, Robert W., manager of the Providence, R. I., office of the General Electric Co., has been elected president of the Providence Engineering Society.

Bartlett, H. H., is now office engineer with the engineers of Highland Park, Mich. He has been in charge of the sanitary experiment station of the University of Michigan and superintendent of maintenance of the Eastern Washtenau good roads district, Mich.

Beck, Edward A., has been appointed city manager of Goldsboro, N. C., at a salary of $275 per month. The appointment takes effect Sept. 1.

Blinn, Ray S., has resigned as city manager of Westerville, O., and will enter the contracting business.

Compton, Maj. R. Keith, has resigned the chairmanship of the paving commission of Baltimore, Md., having been called into the Federal service. He will continue as member of the commission and as consulting engineer.

Magee, William A., Pennsylvania public service commissioner, has resigned to run for the Pittsburgh mayoralty.

Marston, A., dean of the College of Engineering at Ames, Ia., has been mustered into service as major of an engineering battalion.

Prior, J. H., formerly chief engineer of the Illinois Public Utilities Commission, has left the service of the commission to engage in practice as consulting engineer.

Skeggs, John H., has been placed in charge of Public Roads and Rural Engineering work in and around Tucson, Arizona.

NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

WINTHER MOTOR TRUCKS

For Hauling and for Fire Apparatus.

The principal features of the Winther motor truck are the constant mesh transmission, four bearing crankshaft, variable frame lengths, locking differentials, chassis lubrication and internal gear. The Winther truck is made in four models, 1½ to 2-ton capacity, 2½ to 3-ton, 3½ to 4-ton and 5 to 6. All types of body are made: Stake, dump or fire apparatus. A six-cylinder fire truck chassis and a four-wheel drive truck for standard gauge railway track are also made.

The following specifications for the 3½-4-ton model will serve to illustrate the general design and construction of the line. The motor is a Wisconsin, 4½x6, four-cylinder. The valves are tungsten steel, very large. The carburetor is Master. The gasoline feed is Stewart vacuum system. Ignition is by Eisemann high tension magneto. Lubrication is by force feed through hollow crank shaft. The radiator is of the cellular type, cast shell, spring suspended. The clutch is dry plate. The transmission is three-speed, constant mesh type. Stearing gear, worm and nut, non-adjustable. Internal gear is mounted in unit with drop forged rectangular dead axle. The front axle is Timken I-beam with Timken bearings. The springs are chrome vanadium, semi-elliptic, 46x3 front and 56x4 rear. The wheels are cast steel, 36 front and 40 rear. The brakes are double external expanding on rear wheels. The frame is 7-inch ship channel, size depending on wheelbase. The speed is governed to 12 miles per hour. Tires are 36x5 front, 40x5 dual or 40x10 single, rear.

In the dump truck a horizontal hydraulic hoist is used. The hydraulic cylinder is of short stroke and the power is so applied that the body is raised to the required dumping angle much more rapidly than when the lifting arms are attached to the front end of the body. In raising the body with this hoist the greatest strain on the truck frame comes over the rear springs and rear axle instead of midway on the truck frame, as with the vertical hoist. The cylinder is laid horizontally on the truck frame, underneath the body and protected by it, permitting the body to be so mounted that the forward end will just clear the back of the seat. Because of the better load distribution claimed for this type of construction, a shorter wheelbase and turning radius are possible. The body is no higher than the back of the seat on the truck. The body will hold, in the four models, 1⅜, 2½, 3⅓ and 5 cubic yards of asphalt respectively; 3, 4½, 6 and 9 cubic yards of garbage; 1½, 2¼, 3 and 5 cubic yards of gravel, sand or crushed stone.

The fire truck illustrated has a capacity of 1,500 feet of 2½-inch hose and is fully equipped with chemical tank, two three-gallon extinguishers, hose reel and basket, 200 feet of chemical hose, twenty and twelve-foot ladders, nozzle, poles, axes, lanterns, etc. The special six-cylinder fire truck has a 5¾x7 six-cylinder motor, Westinghouse electric lighting and starting outfit, Goodrich de Luxe tires and is equipped with a 350, 500, 750 or 1,000-gallon per minute pump. The equipment is made by Peter Pirsch, Kenosha.

The accompanying illustrations show a diagram of the dump truck and a photograph of the rear of a fire truck. The trucks are made by the Winther Motor Truck Co., Kenosha, Wis.

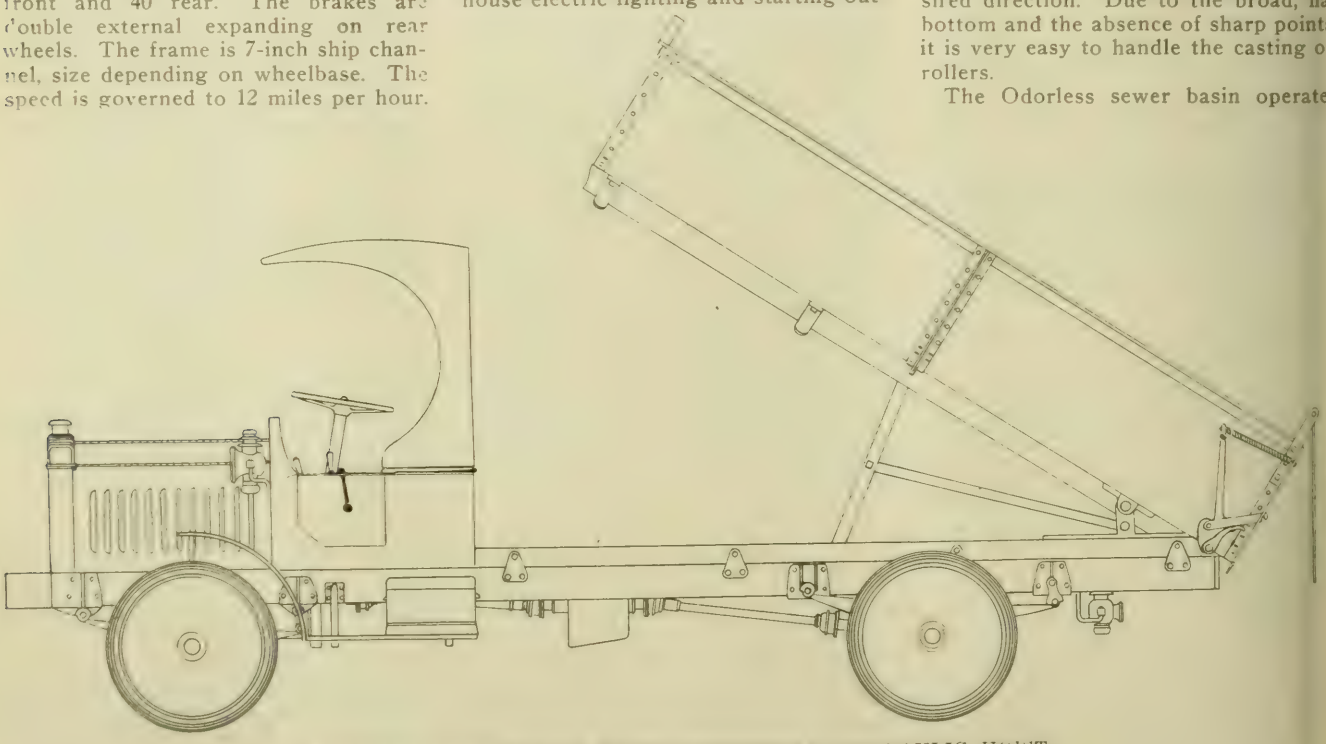
"ODORLESS" SEWER BASIN.

Of Novel Construction to Simplify Cleaning and Operation.

The Odorless sewer basin is claimed to eliminate the insanitary conditions which may frequently be traced to the ordinary sewer basin and to reduce the time, cost, labor and inconvenience in cleaning. It is found that one man, with a long handled shovel, can clean as many Odorless sewer basins in a day as two men can clean of the old style basins in five days. It is easily installed by any laborer and it is possible to move it just as easily when alterations to grade or width of street are necessary.

This basin is constructed of pure cast iron throughout. There is no machine work done on it. It is solid, strong and durable. The upper part, including the street grating, is a separate casting, secured by lugs and bolts, so that any special design can be furnished to meet city requirements. This also allows the top to be turned, so that the sewer connection can be made to run in any desired direction. Due to the broad, flat bottom and the absence of sharp points, it is very easy to handle the casting on rollers.

The Odorless sewer basin operates



WINTHER DUMP TRUCK WITH HORIZONTAL HYDRAULIC HOIST.

s follows: Water and rubbish enter hrough the street opening A and pass to basin B. The solid matter settles trap cover C, while the liquid passes hrough the end grating (or filter) D, nd then by way of the trap E into the ewer F. Water in the trap prevents he egress of odors, gases and germ aterial, the trap holding sufficient wa- r to last through the longest dry ell. Solid matter lying on the trap over rapidly dries out so that it can

collected in a dry or semi-dry condi- on. While the trap is continually ushed out by wash from the street, is a simple operation to raise the ap cover and clean the trap. Since e walls of the basin do not crumble deteriorate or allow seepage, oubles sometimes occurring in other pes of construction are eliminated. reezing difficulties are also claimed be stopped.

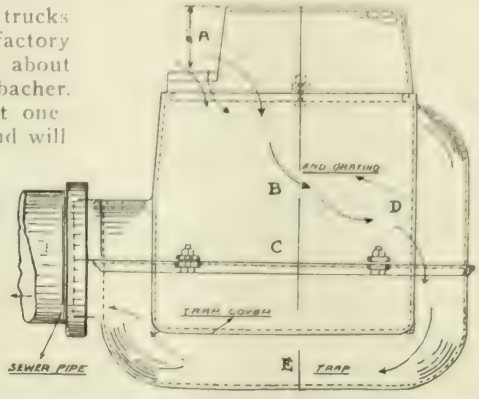
This sewer basin is in wide use, mong the cities having its service be- g Youngstown, E. Youngstown, Co- mbus, Canton and Fostoria, O., Al- ona and Sharon, Pa. Toledo has re- ntly made new installations.

The accompanying illustrations show diagrammatic perspective and a sec- on of the basin. It is made by the dorless Sewer Basin Company, 15 ick avenue, Youngstown, O.

NDUSTRIAL NEWS

Cast Iron Pipe.—Prices continue at e record high levels of last week. unicipal business is appearing in a w scattered jobs. The government urging deliveries on the pipe con- acted for for use in France and in e army cantonments. The 400-ton recently asked for by Whitefish y, Wis., went to the American Cast on Pipe Co. At the recent Akron, io, letting 1,340 tons went to the ardware & Supply Co., bidding for e National Cast Iron Pipe Co., and 40 tons to the United States Cast on Pipe & Foundry Co. The gov- nment, among other orders placed in East, gave one to the United tes Cast Iron Pipe & Foundry Co. 600 tons for delivery at Rockford, Quotations: Chicago—4-inch, class and heavier, $68.50; 6-inch, $65.50. w York—4-inch, class B and heavier, .50; 6-inch, $65.50. Birmingham— nch, class B and heavier, $63; 6- h, $60; class A, $1 extra.

The Duplex Truck Company, Lansing, Mich., through H. M. Lee, president and general manager, announces the appointment of Andrew Langenbacher as sales manager of the corporation. Mr. Langenbacher was formerly in charge of exports, as well as a sales division of the Reo Motor Car Company, and has a wide acquaintance with automobile distributors. Mr. Langenbacher says because of the fact that production of Duplex trucks is to be increased the dealer organization of the company is to be doubled at once. "The value of the Duplex trucks to be manufactured in our new factory buildings next year will total about $12,000,000," said Mr. Langenbacher. "We now have dealers in about one half of the states in the Union and will allot the remaining territory to new dealers so that our dealer organization will spread completely over the United States by the first part of the new year."

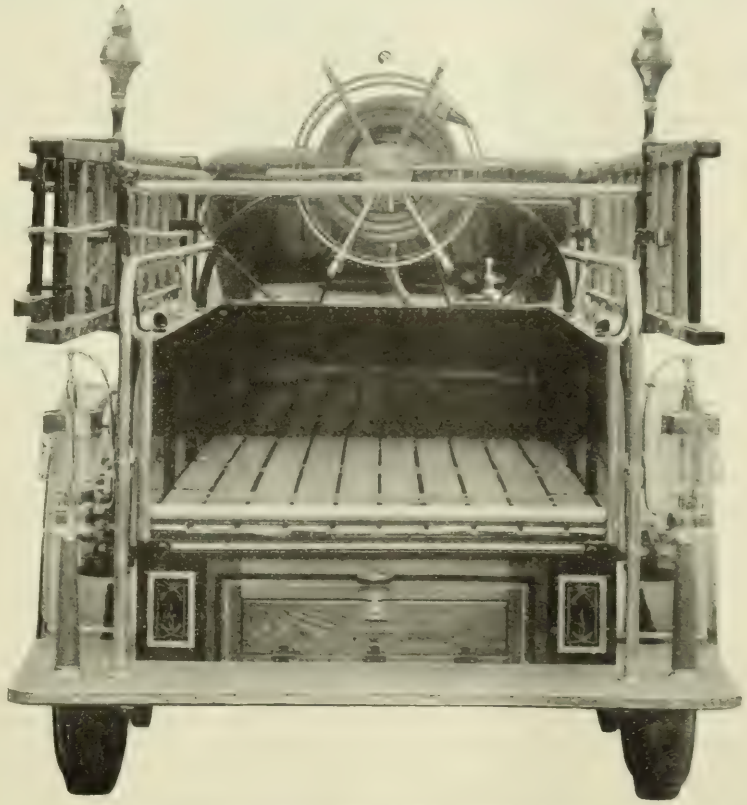


THE "ODORLESS" SEWER BASIN.

U. S. Contracts for More Trucks.—In addition to the $23,000,000 worth of motor trucks recently ordered for the War Department, orders have been placed for 5,750 vehicles at an aggregate cost of $21,000,000, making about $44,000,000 worth of army motor trucks now under contract. The quartermaster's depot in Chicago has also been advised to buy 192 light trucks of large chassis and Babcock delivery bodies for the army cantonments, 12 to be issued to each place, the cost being $750 each.

The Packard Motor Car Co., Detroit, received a contract for 3,000 trucks of 3-tons capacity, of which 1,200 will cost $3,197.39 each, and 1,800 will cost $3,836.87 each. The Locomobile Co. of America, Bridgeport, Conn., received a contract for 1,250 trucks at $4,071.38 each and the Pierce-Arrow Motor Car Co., Buffalo, 1,500 trucks at $3,500 each, all of 1½ tons capacity.

Walter A. Zelnicker Supply Co., St. Louis, Mo., has just issued its "Blue Streak Special" bulletin, No. 222. This announcement lists some of the company's best machinery offerings, including locomotive cranes, concrete mixers, air compressors, boilers, hoists, steel piling, generators, motors, pumps and



PIRSCH-WINTHER FIRE APPARATUS

pipe. The bulletin should be of immediate interest to all contractors and others who need equipment in a hurry. EXPERTS

The Rochester Excavating Machinery Co., Inc., has moved its Rochester office to its new factory at Caledonia, N. Y.

The Ingersoll-Rand Co., 11 Broadway, New York, N. Y., announces the election of J. H. Jowett, formerly general sales manager, to be vice-president of the company. His place will be taken by J. D. Albin, former assistant general sales manager.

NEWS OF THE SOCIETIES

(Continued from page 187)

caution or carelessness, but also in the less hazardous industries.

The interesting series of exhibits will be that showing how the lives of our soldiers and sailors are being guarded as efficiently as possible under the extraordinary conditions the present war has developed. Demonstrations of the weird-looking gas mask for contending against suffocating and lachrymos gases, the various types of camouflage, or methods of painting scenery and arranging foliage so as to hide batteries and transports to deceive the enemy, and the modern sanitary ideas in vogue at the war hospitals, should form a tremendously interesting exhibition. Several dozen reels of motion picture film showing the operation of safety devices and the dangers of neglecting these precautions are to be shown daily. It is believed that this exposition will have an excellent effect upon the thousands of factory employees who will have an opportunity to see it.

Pennsylvania League of Third Class Cities.

The program for the convention of the League of Third Class Cities to be held in Harrisburg August 28, 29 and 30 has been announced. It is as follows:

Tuesday, August 28.

Morning session, 10 o'clock—Reception and registration of delegates; prayer, the Rev. Ellis N. Kramer; address of welcome, John E. Fox, city solicitor of Harrisburg; response, Ira W. Stratton, vice-president of the league; roll call of delegates; reports of the secretary of the league, treasurer of league and executive committee.

Afternoon session, 2 o'clock—Address by Dr. Samuel G. Dixon, state health commissioner; address, "Method of Street Paving and Assessments," M. B. Cowden, city engineer, Harrisburg; address, "What One City of the Third Class in Pennsylvania Has Accomplished Under the Commission Form of Government," R. Nelson Bennett, superintendent of accounts and finance, Wilkes-Barre.

At 4.30 o'clock, review of Harrisburg's volunteer fire department, Market square.

Evening, 8.30 o'clock—Reception and smoker in honor of the delegates at the Harrisburg Club, by members of Harrisburg city council.

Wednesday, August 29.

Morning session, 9.30 o'clock—Address, T. C. Hare, city solictor of Altoona; address, "Workmen's Compensation Law," Harry A. Mackey, chairman of the Workmen's Compensation Board; report of law committee, James A. Gardner, city solicitor of New Castle, Pa.; open discussion.

Afternoon session, at 2 o'clock—Address, "Relation of Public Utilities to Third Class Cities," William B. Ainey, chairman of the Public Service Commission; address, "Civil Service Administration in Cities of the Third Class," Cyrus D. Foss, counsel and secretary of the Civil Service Reform Association of Pennsylvania; address, "Weights and Measures," James Sweeney, chief of the State Bureau of Standards; lecture, "Awakening of Harrisburg," J. Horace McFarland, secretary of the Harrisburg Municipal League.

Evening—Banquet at the Palm Room, Elks Club, 216 North Second street.

Thursday, August 30.

Morning session, 9.30 o'clock—Address, "City Planning," by member of the Harrisburg Planning Commission; address, "Food Inspection," Dr. J. M. J. Raunick, Jr., Harrisburg health officer; open discussion; unfinished business, new business, fixing place of meeting, election of officers, adjournment.

Afternoon, 2 o'clock—Delegates are requested to report promptly at the hour above mentioned for an automobile trip over the park system, after which the Romper Day exercises will be witnessed at Reservoir Park.

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

Sanitary SEWERS are being constructed by Sloan, N. Y., plans having been completed by the engineer, Geo. C. Diehl, 575 Ellicott square, Buffalo, N. Y.

SEWERS constructed by Avalon, N. J., were planned by Ralph R. Goff, Ocean City, N. J.

A SEWAGE DISPOSAL PLANT is being constructed by Brentwood, Pa. Plans and specifications were the work of Douglass & McKnight, Union Bank building, Pittsburgh, Pa.

A SEWER constructed by Bedford, O., was planned by C. W. Courtney, 509 Leader-News building, Cleveland, Ohio.

In making STREET IMPROVEMENTS, Lodi, O., had the engineering services of R. G. Scantlebury, Ashland, Ohio.

A sanitary SEWER to be constructed by Villisca, Ia., was planned by Theodore S. DeLay, Lichty building, Creston, Ia.

In making PAVING IMPROVEMENTS, Clinton, Okla., has the consulting engineering services of the Benham Engineering Co., 1300 Colcord building, Oklahoma City, Okla.

A CONCRETE BRIDGE is to be constructed by Lindsay, Ont. The plans and specifications for the structure were prepared by Bowman & Connor, 31 Queen street, W., Ontario.

Jackson, Mich., is installing new MACHINERY in its WATERWORKS. The consulting engineer on the improvement is Seabury G. Pollard, 3422 Burch avenue, Cincinnati, O.

The Red River bridge district, Miller County, Texarkana, Ark., is to build a concrete HIGHWAY BRIDGE to cost $250,000. The engineers are Harrington, Howard & Ash, Orear-Leslie building, Kansas City, Mo.

Judith Gap, Mont., is making a number of STREET IMPROVEMENTS The engineers for the work are Gerharz-Jaqueth Engineering Co., 514 First National Bank building, Great Falls Mont.

Stanley, N. D., is extending its SEWER SYSTEM. The engineer for the improvement is T. R. Atkinson, Bismarck, N. D.

In constructing SEWERS, Exeter Pa., has the engineer services of Harry Myers, P. O. building, Pittston, Pa.

Ponca, Neb., is to construct SANITARY SEWERS. Plans are in process of preparation by the engineer, C Monarty, 500 United Bank building Sioux City, Ia.

Huntsville and Kahoka, Mo., have been considering the improvement o their WATERWORKS and SEWER SYSTEMS. The cities have had th expert advice of E. T. Archer & Co 609 New England building, Kansa City, Mo.

Farmville, Va., is making a numbe of STREET IMPROVEMENTS. Th engineer for the work is W. M. Piatt Durham, N. C.

Franklin County, Columbus, O., i to construct a reinforced CONCRETE BRIDGE. The consulting engineer for the work are Braun, Fleming & Knollman, Columbus, O.

The village of Altamont, N. Y., is t construct SEWERS and a DISPOSAL PLANT. The engineer preparing plan and specifications for the work is W W. Chadsey, 20 Swan street, Schenectady, N. Y.

The Chicago, Ill., Sanitary District in its work on the SEWERAGE an DRAINAGE SYSTEMS of the district has appointed as consulting engineer A. Baldwin Wood, of the Sewerage and Water Board, New Orlean La.

Municipal Journal

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SEWERAGE SYSTEM OF DAYTONA

Complete Collecting and Treatment Systems for a Flor ida Town—Screening, Chlorine Disinfection and Pumping of Sewage—Fourteen Ejectors Operated by Compressed Air at Several Lifting Stations.

By GEORGE A. MAIN.*

Until the new sewerage system at Daytona, Florida, was put into operation in the fall of 1916, sewage waste was disposed of either by numerous independent private sewers discharging by gravity directly into the Halifax river (on the western banks of which the city is situated); by cesspools in those sections of the city which, on account of insufficient fall or on account of distance from the river, could not be practically served by the sewers; or by the bucket system which prevailed almost exclusively in the colored sections.

Daytona had already attained a population which justified an efficient sewerage system. But even if this were doubtful, Daytona is a winter and summer tourist city, and in catering to well-to-do northern tourists it is good policy to be guided by their sentiments and keep in advance of actual requirements along sanitary lines. Again, and of scarcely less importance, was the fact that for years the oysters which abound in the waters of the Halifax had been considered, and were in fact, unfit for table use. This last fact emphasized the importance of providing a system designed to disinfect the sewage and eliminate stream pollution, which would again permit the use of the oysters as they had been prior to the inroads of civilization—huge tree-covered mounds of oyster shells on the river banks bearing mute but irrefutable testimony to the position which the Halifax river oyster had held among the foods of the aborigines of the east coast of Florida.

Accordingly, there was voted in 1914, and subsequently floated, a bond issue of $175,000 for "Sewerage and Drainage." The question of type of system was left to consulting engineer George W. Fuller, of New York City. The local engineering, both preliminary and construction, was in the hands of C. M. Rogers, of D. D. & C. M. Rogers, an old-established Florida firm of civil engineers. This sewerage system has now been in successful operation for several months.

About ten per cent of the proceeds of the bond issue were devoted to drainage, as suggested by both wording and intention of the bond issue. A prominent ridge extends through the city, paralleling the river, and about one-sixth of a mile therefrom. Supplementing the drainage previously provided exclusively by several "canals" constructed hundreds of years ago by the Spaniards when they held this territory, but which were insufficient and subject to rapid stoppage by vegetation, the bond issue has provided two large gravity drains reaching from the flats west of the ridge, under it to the river. This drainage is of very great value, particularly during the fall rainy season. It is chiefly with the sanitary sewerage system, however, that we are at present interested.

As a basis for cost keeping, the investment of the proceeds of the bonds and current outlays for enlargements are classified as follows:

Tangible general assets (administrative, recording and accounting equipment);

Intangible general assets (preliminary and engineering costs);

Operating management properties (tools, etc.);

Sewage *collecting* system: Sewers, manholes, flush tanks, etc.; air lines and ejectors;

Sewage sterilizing or *disinfecting* system;

Sewage *disposal* system: Equipment for separating and handling *solids*; *liquids* disposal system;

Drainage system;

Miscellaneous assets;

Funds.

The above, the order of which is to some extent suggested by the course of the sewage through the system, presents an idea as to the construction and equipment entering into the sewerage system, the parts of which will be taken up in the above sequence.

SEWAGE COLLECTING SYSTEM.

The first step in the disposal of sewage is obviously its collection. Primarily, the sewage collecting system comprises the house sewer connections, lateral and trunk sewers, flush-tanks, manholes and lampholes. To insure sufficient grade, to avoid deep cuts through the ridge above referred to, and to avoid deep cuts through ground peculiarly troublesome because of ground water, there was embodied in the sewage collecting system a relay equipment composed of air-operated sewage ejectors, which at certain centers collect the sewage which does not flow to the plant by gravity and boost it to a higher elevation, from which it flows to the plant by gravity.

At the date of this writing there have been 360 house and hotel sewer connections made, which number is of course being increased daily.

With the exception of short stretches of cast-iron

*Superintendent, Board of Public Works.

sewers under railroad tracks and also from ejectors to receiving manholes, the collecting sewers are wholly of vitrified pipe, in sizes ranging from 8-inch to 24-inch, distributed as follows:

Eight-inch, 43,450 feet; 10-inch, 9,957 feet; 12-inch, 14,325 feet; 15-inch, 5,014 feet; 24-inch, 733 feet.

There are 14 flush-tanks in the system, all of which will probably not be placed in use on account of the slight seepage and joint leakage providing enough flush water at some points without resorting to the tanks. There are 139 manholes and 51 lampholes in the system.

The compressed air for operating the 14 Shone ejectors is supplied from a 4-foot by 20-foot air receiver, located in the power plant (appearing at the extreme right in the view) and maintained at air pressure of about 25 pounds by two compressors of 100 and 150 cubic feet per minute capacity, respectively. The air is delivered to the ejectors through about 3 miles of "Universal" pipe, 4 inches in diameter at the plant to 2 inches as the pipe branches to the several ejectors. The 14 ejectors are erected in 7 reinforced concrete pits, 5 situated on the river side of the ridge in the white sections of the city, the other 2 serving the colored population at some distance west of the ridge, not practicably available by gravity alone.

DISINFECTING SYSTEM.

A manual control chlorinating device has been installed to accomplish the disinfection of the liquid portion of the sewage, the arrangement being such that the chlorine may be applied either immediately upon the entrance of the sewage to the plant, or under the sewage screen after the solids have been screened out; the practice being to apply a small part of the chlorine to the unscreened sewage, the bulk of the disinfection being under the screen.

This chlorinating device, just visible on the wall at the extreme left of the accompanying interior view, delivers to the sewage a stream of chlorine at a definite fixed rate of so many pounds per 24 hours. In this respect the manual chlorinator differs from the automatic chlorinators, which continuously change the rate of flow of chlorine to suit the constantly changing rate of flow of sewage. This proportioning of the chlorine to sewage flow is based on the assumption that so many pounds of sewage should have so many pounds of chlorine disinfectant, an assumption of doubtful correctness, since the analysis of sewage during different periods of the day shows that its composition is very different at night from the day analysis, and different during the portion of the day when influenced by industrial wastes from the periods not so affected.

Thorough disinfection of sewage by a manual control chlorinating device can be assured by applying a known excess of chlorine at all times, adjusting the chlorine as the sewage flow is known to increase or decrease, Instead, however, of attempting to adjust the chlorine to a very uncertain and not easily measured flow of sewage, the flow of sewage has been automatically adjusted, by a device originated by the superintendent of the plant, to the constant chlorine flow, thereby insuring continual and correct proportional adjustment of sewage and chlorine. This device, which permits sewage to enter the plant from the trunk sewer only as fast as the particular pump in use is discharging the sewage, is essentially a rate controller, a float in the underscreen chamber maintaining a constant level in the chamber, an additional feature especially desirable in connection with the operation of the screen. The tendency to chlorine economy in the use of this equipment is apparent. The sewage is allowed to accumulate in the trunk sewer for a period of a few hours, during which the composition of the sewage is practically constant. One or more of the 3 centrifugal pumps is then started, the pumping capacity being at the rate of either one, two, three, four or five million gallons daily. The chlorinator is at the same time started and adjusted to the strength of the sewage and the rate of pumpage.

A water level indicator inside the plant shows the height of the sewage in the nearest manhole, thereby preventing excessive accumulation of sewage and also showing the operator during pumping how rapidly he is gaining on the flow of sewage from the city, the aim being to have the trunk sewer empty at those times in the day when the sewage composition changes most abruptly. Attention to the apparatus is required only once in several hours and the device is in effect entirely automatic in its adjustment of the chlorine and sewage. (The device is seen in the view below the floor level and just beyond the screen, which appears in the left foreground.)

BUILDING CONTAINING POWER PLANT.

DISPOSAL OF SOLIDS.

After passing from the trunk sewer through the control valve through the invert and its accompanying coarse bar screen, the sewage flows onto a rotating Riensch-Wurl screen, from the surface of which revolving brushes remove the screenings into galvanized steel receptacles. (A very small segment of the screen is in view just to the left of the suspended chain hoist, which serves for removing the screenings.) As noted above, the automatic control valve maintains a virtually constant level of sewage in the pump suction pit. This level, being independent of the rate of flow, except in that a maximum suction head insures maximum pump output, is determined by the elevation of the screen. Maintaining a maximum elevation results in the utilization of the maximum screen area, the volume of water below relieving the excessive strain on the screen incident to volume of sewage on the screen, through the buoyant effect of the high underscreen level. The screenings fall into cans of convenient size for handling and are drayed to a dumping ground outside the city. There is a decided tendency for the solids to be brushed through the screen, and screenings fall far short of totaling the amounts usually computed, the particles passing through the screen being so small as to readily further diminish in size and be acted upon by the chlorine.

DISPOSAL OF LIQUIDS.

The underscreen pit is the suction well for the centrifugal pumps. Three De Laval pumps, one of one million gallons daily capacity and two of two million gallons capacity, against a static head of about 15 feet, discharge the sterilized screened sewage liquid through about one and one-half miles of 14-inch cast-iron outfall to the river, which it enters at the southern extremity of the city limits.

Two 15-horsepower La Vergne crude oil engines generate the power for driving the centrifugal pumps (which in the view are concealed in the pit at the right), for driving the compressors (one of which is shown in about the center of the photograph), for driving the screen through an angle belt and a below-floor shaft as shown, for driving the small electric generator which lights the building and grounds, and for driving a small rotary pump for emptying cars of fuel oil into the elevated storage tank. Not shown in the view, but symmetrical with respect to the floor location, are the other engine and the other compressor, the end of the engine room not shown in the view also containing a small gasoline engine-compressor unit for compressing air for starting engines. The tool board is located on the wall at the photographer's rear.

While the enlargement, operating expense and upkeep of this very complete sanitary system undoubtedly amount to more than was being individually spent in connection with private sewers, cesspools, etc., the feeling of safety, as far as individual and community health conditions are affected, the gradual elimination of obnoxious odors and ill appearance in an otherwise beautiful river, and the rendering of its abundance of fish, oysters and crabs harmless as a diet, and the satisfaction of enjoying with approving tourists the best possible sanitary conditions—all these are contributing factors to the bountiful compensation of the taxpayers for the expense incurred in providing this up-to-the-minute sewerage system.

UTILIZING OLD TIN CANS.

Information is given by the U. S. Bureau of Commerce, in its "Commerce Reports," of methods by which tin cans can be utilized if considerable quantities be collected, it being therefore especially applicable to municipalities or private individuals collecting in municipalites.

Tin cans may be detinned; or friction-top cans may be cleansed and used in the households; or the caps may be removed from used cans, which may then be filled with paint, chemicals, etc., and new caps applied. In detinning, the products are steel scraps, used in open hearth furnaces; tetrachloride of tin, used in the silk-dyeing industry; pig tin, used in making tin plate; babbitt metal and solder; and solder ashes, which can be refined into solder.

Detinning requires a very expensive plant, the cost probably exceeding $500,000 or more, and there are believed to be only two detinning companies in this country that utilize old tin cans. These companies purchase tin plate scrap from can makers and others, and old tin cans from junk dealers and community organizations; from 10 to 25 per cent of their capacity being devoted to old tin cans. The cans are bought in car-load lots at a fixed price per ton, and are ordinarily divided into three classes:

1. Unused, empty, unrusted tin cans not exceeding one gallon in size, with or without paper labels attached, but otherwise free from foreign material such as water,

INTERIOR VIEW OF POWER PLANT BUILDING.

At extreme right is compressed air receiver for operating Shone Ejectors. Top of Riensch-Wurl screen is just visible at the left foreground. Beyond this, in the same pit, is the automatic chlorine adjuster devised by Mr. Main. The chain hoist is used for removing the screenings. The pumps are in the pit at the right.

ashes, etc., and from paint, varnish, white lead and similar contents insoluble in water.

2. Used, empty and unrusted tin cans not exceeding one gallon in size, and otherwise as described in class No. 1.

3. Used, empty, and unrusted tin cans more than one gallon in size but not exceeding five gallons, and otherwise as described in class No. 1.

A higher price is paid for class 1 than 2 and for 2 than 3, except that if the classes are not packed separately the price is that of class 3. The cans should not be too tightly compressed to prevent cleaning before detinning.

The department asked the two detinning companies whether they could suggest any way of increasing the domestic detinning of used tin cans, and the companies suggested the creation in each of the large centers of the country of an organization for the collection of used tin cans, stating that, if such collection could be so maintained and a fairly constant quantity of cans could be assured, the companies would be willing to increase the capacity of their plants in order to meet the increased quanties resulting from such effort. They stated that they would be glad to cooperate in any organized effort toward making such collections throughout the country. They stated, however, that the amount of chloride of tin at present produced exceeds the demand for it, and they would not increase the capacity of their plants for manufacturing this product of the process. They also suggest that householders be encouraged to segregate empty cans so that they can be collected more economically and promptly, and also to so store them as to avoid rusting, which renders the cans useless for detinning.

The department suggests that State councils of defense, chambers of commerce, boards of trade, and other trade organizations could be of great service to the country at this time by considering the matter from a local standpoint with a view to eliminating unsightly dump heaps and at the same time increasing the pig tin supply of the country, and at some profit to themselves. The names of the two companies can be secured from the Bureau of Foreign and Domestic Commerce, Washington.

CLEANING SEWERS IN HOLLAND, MICH.

By R. B. CHAMPION.*

The Holland, Mich., Board of Public Works has been using a sewer cleaning machine recently for cleaning some 8-inch and 10-inch sewer, and their experience so far has been as follows:

It requires four men to operate the machine. Generally after the machine is all set up and ready to operate, with the cable in place, the actual time of cleaning 300 feet of sewer, providing time is not lost through having the bucket stuck, is nine hours.

Up to and including August 2nd we have cleaned 14,472 feet of sewer pipe, all of which is 8-inch with the exception of 660 feet of 10-inch pipe. The cost has been as follows:

Cartage	$13.00
Labor (at 30c per hour)	638.66
Supplies	59.86
Total	$711.52

This gives an average cost of 4.92 cents per lineal foot.

These costs include one piece 307 feet long which was cleaned at a cost of 26 cents per foot, this high cost being because of the necessity of digging up quite a section of it. A good deal of time was lost on this piece in getting the sewer rods through from one manhole to another on account of the condition of the sewer.

The sewers we cleaned were in all conditions of stoppage, from sections that cost but 0.6 cent per foot to the one above mentioned that cost 26 cents. We find that where no difficulties are encountered in getting the cable through from one manhole to the next and when there are no obstructions which cause the bucket to be stuck, a sewer that is half full of sand can be cleaned with this machine (a Kuhlman sewer cleaning machine) at a cost of 2 cents per foot.

*Superintendent, Board of Public Works Holland, Mich.

MUNICIPAL PUBLIC MARKET*

Wholesale, Retail and Farmers' Markets—Advantages and Disadvantages of Each and Extent of Use—Site and Construction.

Public markets may be classified as terminal wholesale markets (of which there are none in this country, but several in Europe); wholesale markets, the object of which is to enable retailers to purchase their stock at convenient times, as quickly as possible, and at reasonable prices; municipal retail markets, and curb or farmers' markets, where the growers of produce can sell directly from their wagons.

Wholesale Markets.—It is claimed for wholesale markets that they eliminate (1) unnecessary transportation by retailers and farmers, (2) unnecessary middlemen, (3) high rents, (4) duplication of overhead charges, (5) unnecessary labor, (6) losses through depreciation by delays and rehandling, (7) that they reduce the cost and increase the efficiency of inspection, and (8) permit economic and efficient delivery. Of 154 cities of more than 30,000 population, six reported having wholesale markets, one city having two; while twenty-seven had a total of thirty-six combined wholesale and retail markets. All cities having wholesale markets operate other markets also.

Retail Markets.—The advantages of the municipal retail market have been summarized as follows: (1) It should give to patrons, who will pay cash for their purchases and carry them home, a dollar's worth of actual products for a dollar spent. When a buyer does not demand or use credit and delivery service, he should not be charged for it. (2) The prices should also reflect to the consumer the saving which is made possible to the dealer through low rent of his stall and equipment, as well as other reductions in overhead expenses. (3) Patrons should be able to find at the market a larger and fresher assortment of food products than the average private establishment offers. (4) Due to the possibility of close official inspection, the consumer has a right to look for increased protection in quality, weight and measure.

The experience of cities generally seems to be that the greatest field for the successful operation of retail markets is the direct sale to the consumers by producers of perishable goods. It is generally held that retail markets are as a rule more successful in the smaller cities which have a producing area in the vicinity and where the greater part of the food supply does not have to be hauled from any far distant point.

There are some who contend that municipal retail markets have not been able to stand competition with private stores, that they can not be moved easily when neighborhoods change in character, and that in only a

*Abstract of a report by the State Bureau of Municipal Information of the New York State Conference of Mayors and Other City Officials.

few instances have they brought in an adequate return on the capital invested. It is also claimed that farmers cannot afford time to remain at the market for a large part of the day to sell to consumers, and that consumers in general cannot afford the time necessary to visit the market, because of either household duties or social interests; that only an infinitesimal part of the food supply of a large city can be produced within hauling distance; that the markets can be operated only part of the year; and that the competition of public markets can not have much effect on food prices because consumers are willing to pay for the superior service furnished by retail stores.

In reply to these criticisms it may be said that the experience of a number of American cities that have established retail markets, particularly central markets, seem to refute these arguments. In many of these the farmers do remain to dispose of their goods, the patronage of the consumers is good, they are operated all the year, and they do have an effect on the prices in retail stores.

It was recommended by one city that a retail market should be managed by a well-paid and competent head; that competition should be encouraged by allowing a number of persons to sell all food products not locally produced, but that they should not be allowed to crowd out local producers.

Curb or farmers' markets are found in a large number of cities, especially the smaller ones, in several cases operated in connection with a wholesale or retail market, some believing that every retail market should provide space for farmers' and hucksters' wagons. Such a market can be located along the curb of some suitable street or on a vacant lot.

Many cities operating a curb market in connection with a retail market have experienced much difficulty in keeping the professional huckster from crowding out the farmer. In Seattle a farmer, before he can use the market, must furnish the inspector with his name, post office address, description of the property upon which he farms, name of its owner, number of acres, kind of produce he raises, and (if he leases) when his lease expires. He then receives a brass tag from the inspector containing a number corresponding to the number of his record, which tag entitles him to a place in the market and must be shown whenever called for by the inspector.

It is claimed by its advocates that this type of market offers many advantages to a city that is just inaugurating a municipal market policy in that it can be started with little trouble and expense and can be moved easily if the first location is found to be faulty. Its disadvantages are that it affords to the products little or no protection, sanitary or otherwise, does not shelter the seller or his patron from the weather, and affords satisfactory service only during the months of production.

The market site is a very important consideration. Poor location has been the cause of many of the failures that have occurred. A terminal or wholesale market should be established where it can be served easily by the railroads, or by boats if there be water transportation.

"The selection of a site for a retail or curb market or a combined wholesale and retail market is more difficult, and the many factors to be considered vary with the size of the city. It is agreed by all that before selecting a site the city should quite definitely decide whether its policy shall be to operate a central market only, or one with several branch markets. Both plans have their advocates and each has been successful in some cities, but in a majority the small public market placed in densely populated residential sections have not as a rule proved so satisfactory as those which have one or more large ones centrally located in the business section. It is pointed out by many that the reason for the success of the large central market is that the efficiency of the establishment depends upon having the maximum of produce and number of customers meet in one place. G. V. Branch, investor of city marketing for the Federal Government, says that farmers will drive past the small markets in residential centers to sell in the larger markets where their trade is assured and that patrons go to the same places to get the advantage of a larger assortment, and also because they usually have to go to the business district to shop. 'It should be noted, too,' he says, 'that the value of a residential market is more subject to depreciation from shifting population than is that of a market more centrally located.'

"A summary of opinions as to location indicates that large municipal markets should be centrally located; that in small or medium-sized cities which have only one retail market each, it should be as near to the business center as possible and accessible; and that in large cities having more than one retail market, they should be located in the subsidiary business centers. Wherever located, the market, it is agreed, should be within walking distance of as large a tributary population as possible and as near to as many street car lines as is practicable. In selecting a site the possible use of trolley freight service and the provision for expansions to meet future demands should not be overlooked."

Market Construction.—"The theoretically perfect market is that equipped with artificial ice plant, artificial heat, abundant light and ventilation, raised counters of glass, marble, tile, soapstone or slate, and provided with refrigerator equipment, floors of non-absorbent material, adequate flushing and drainage, comfort stations, and with the stalls for fish and other sea food segregated. The most popular form of market at present is an enclosed building for the sale of meat, fish, butter and other produce that should be protected, and an open space equipped with sheds for the wagons of farmers and hucksters."

Municipal Journal has described a dozen or more municipal markets during the past few years, in several cases in quite complete detail.

PAINTS FOR METAL SURFACES*

Materials of Basic Nature or Containing Soluble Chromates Prevent Rusting—Leads, Zinc, Carbon, Iron Oxide and Bitumens—Galvanized and Tin Surfaces.

In designing protective coatings for metal, the modern practice has been to apply the results available from researches into the causes of corrosion. These results have shown that materials of a basic nature or substances which contain soluble chromates prevent the rusting of iron. For this reason pigments of a basic nature or pigments containing the chromate radical have come into use in the manufacture of protective paints. That they are the best has been proved by practice and by test. This article will take up the use of the various pigments under separate headings, considering the paints suitable for use on structural steel, bridges, railroad equipment, ornamental iron work, poles, posts and general work on metal surfaces.

The red lead paints may be purchased in the market ground to a heavy paste in linseed oil, ready to thin for use. One of the most valuable properties of red lead is

*From a paper by H. A. Gardner before the Affiliated Engineering Societies of Minnesota.

its ability to set up a hard, elastic film that shuts out moisture and gases apt to cause corrosion. This cementing action is due to the presence of unburnt litharge, a pigment which reacts upon linseed oil to form a lead linoleate compound; it will be seen, therefore, that red lead free from litharge has no cementing action and should not be considered more protective than iron oxide or any other similar neutral pigment. It is essential that red lead should be highly basic and should contain a considerable percentage of litharge if the iron is to be protected from corrosion.

It is a growing custom to use prepared red lead paints made from finely ground red lead and linseed oil. These paints remain in excellent condition for a long time, have a high protective value and are well suited for general purposes. They are used extensively for priming steel vessels.

Of the red paints, iron oxide has been one of the most widely used pigments for the manufacture of protective coatings. There are many grades from the brilliant red containing 98 per cent. down to the natural mined brown shale oxides, containing from 30 to 60 per cent. of ferric oxide, the balance being silica, clay, etc. It is customary to add to iron oxide from 10 to 20 per cent. of zinc chromate, zinc oxide or red lead, in order to make them rust inhibitive. These paints are used largely for tin roofs, metal siding and structural steel.

Mixtures of white lead and zinc oxide, tinted gray with carbon black, are widely used and give excellent results. The use of two parts of blue lead and one part of linseed oil containing about 5 per cent. of turpentine drier also makes a useful paint of about the proper consistency. The rust preventive value of this paint is due to the high percentage of lead oxide or litharge. It may be purchased ground to a paste in oil.

Black paints are often preferred for the final coat on steel work. Carbonaceous paints are unsuited for direct application to the metal, and carbon pigments, such as gas carbon black, oil black or graphite are usually used. Magnetic black oxide of iron forms an excellent black protective paint when ground in linseed oil. Willow charcoal is not made in commercial quantity and its use is restricted on this account. Its rust preventive value depends upon the basic nature of the impurities present.

Green paints, formed from mixtures of zinc chromate and Prussian blue in oil, are highly protective and have proved satisfactory in long service tests. Chrome yellow tinted with black oxide of iron to an olive shade is very permanent and protective. Chrome green made from lead chromate and Prussian blue is often used with a barytes base.

Bituminous coatings have a wide use for special purposes. They may be made by blending a refined coal-tar pitch, asphalt, linseed oil and oleo-resinous varnishes, afterward thinning with turpentine or light mineral thinner. A heavy-bodied blown petroleum residual pitch has recently come into wide use. This has high resistance to acids and is not readily acted upon by the sun.

When coal-tar is used in the manufacture of paints it should be refined by heating to about 115° C., until the water is evaporated. From 5 per cent. to 10 per cent. of lime may be stirred in to neutralize the free acids. The addition of Chinese wood oil and asbestine in a coal-tar paint aids in producing a more resistant film.

Bituminous paints of the above composition are used as coatings on pipe lines in acid factories, on metal submerged in water and for similar work. For such purposes it is generally advisable to first coat the metal with a hard drying prime coating made by adding 2 pounds of litharge to a prepared red lead or other protective paint. The bituminous paint may then be applied. Steel mine structures subjected to sulphur water and gas, reservoir tanks containing water, tunnel metal, etc., may be preserved from corrosion by this method.

Galvanized iron must be painted to be kept from rusting. Paints are apt to peel from it on account of the smooth surface. This condition may be remedied by treating the metal with a solution of copper salts before painting. This may be prepared by dissolving 4 ounces of copper acetate, copper chloride or copper sulphate in a gallon of water and brushing this solution on the galvanized iron.

Tin plate will corrode rapidly unless protected by paint. Before applying paint, the sheets should be rubbed with a cotton rag saturated with turpentine or benzine to remove the oil on the surface. Iron oxide paints are widely used for preserving tin. For dipping purposes, turpentine or mineral spirits should be used for thinning. Cheap driers with a low boiling point benzine should be avoided.

STATE MOTOR TRUCK LAWS

Charges Made by Each of the States for Trucks of Various Weights, Powers, Tire Construction, Uses, etc.

There is a complete lack of any standard method of taxation for motor trucks in the various states. Many states make no distinction between pleasure and commercial vehicles; other states have taxed the tonnage capacity. The *Commercial Vehicle* gives the systems and charges for the various states as follows:

Alabama—Less than 25 hp., $7.50; 25 to 29 hp., $12.50; 30 to 39 hp., $17.50; 40 hp. and over, $20.

Arizona—25 hp. and under, $5; 26 to 40 hp., $10; over 40 hp., $15.

Arkansas—All motor vehicles, $10.

California—Equipped with pneumatic tires, same as passenger cars, 40 cents per hp.; others pay additional; less than 2 tons unloaded, $5; 2 to 3 tons, $10; 3 to 5 tons, $15; over 5 tons, $20.

Colorado—20 hp. and under, $2.50; 21 to 40 hp., $5; 41 hp. and over, $10.

Connecticut—One-half ton or less, $11; 1 ton, $15, and increasing to $225 for 10 tons, and $50 per additional ton.

Delaware—All cars $5 each.

District of Columbia—All vehicles $2 each.

Florida—Trucks, 1,000 lb. or less, $10; 1,000 to 2,000 lb., $20; 2,000 to 3,000 lb., $30; 3,000 to 5,000 lb., $40; over 5,000 lb., $50.

Georgia—Not exceeding 1 ton weight, $2; not exceeding 3 tons, $4; not exceeding 5 tons, $5; exceeding 5 tons, $6.

Idaho—30 hp. or less, $15; 31 to 40 hp., $20; 41 to 50 hp., $25; over 50 hp., $40.

Illinois—May be registered locally. Fees not to exceed $10 for 35 hp. or less, and $20 when over 35 hp.

Indiana—All commercial cars, $5.

Iowa—20 hp. or less, $8; over 20 hp., 40 cents per hp.; all electric and steam cars, $15 each.

Kansas—All vehicles, $5 each.

Kentucky—Less than 25 hp., $6; 25 to 50 hp., $11; 50 hp., $20.

Louisiana—All motor trucks, $7.50 each.

Maine—Motor trucks, $10.

Maryland—Trucks with solid tires and rated capacity of not more than 1 ton, $8; for each additional ton, $6; trailers, $5 each.

Massachusetts—Trucks under 1 ton, $5; and $3 for each additional ton.

Michigan—Electrics, 50 cents per motor hp. plus 25 cents for each 100 lb. of weight; others, 15 cents per hp. plus 15 cents per 100 lb. of weight.

Minnesota—All $1.50.

Mississippi—4,400 lb. capacity or less, $8.40; over 4.400 lb., $16.80.

Missouri—Less than 12 hp., $2; 12 to 23 hp., $3; 24 to 35 hp., $5; 36 to 47 hp., $7; 48 to 59 hp., $8; 60 to 71 hp., $10; 72 hp. and over, $12.

Montana—All $2 each.

Nebraska—All $5 each.

Nevada—20 hp. or less, $3; 21 to 40 hp., $5.50; over 40 hp., $8.

New Hampshire—15 hp. or less, $10; 16 to 30 hp., $15; 31 to 40 hp., $20; 41 to 50 hp., $25; 51 to 60 hp., $30; over 60 $40.

New Jersey—Unloaded weight 2 tons or less, same as passenger cars; above 2 tons, $10 in addition to hp. rating; trailers, $3.

New Mexico—Less than 12 hp., $2; 12 to 19 hp., $4; 20 to 29 hp., $6; 30 to 39 hp., $8; 40 to 49 hp., $10; 50 hp. or over, $12.

New York—$5 a ton.

North Carolina—25 hp. or less, $5; 26 to 40 hp., $7.50; over 40 hp., $10.

North Dakota—All vehicles $3 each.

Ohio—Electric vehicles, $3; all others, $5.

Oklahoma—50 cents per hp. first year; second, 40 cents per hp.; third, 30 cents per hp.; and thereafter, 20 cents per hp.

Oregon—Electric trucks, $5; others same as passenger cars, 26 hp. and less, $3; 27 to 36 hp., $5; 37 to 40 hp., $7.50; above 40 hp., $10.

Pennsylvania—With pneumatic tires, same as passenger cars; others, including load, less than 2 tons, $5; 2 to 2½ tons, $10; 2½ to 5 tons, $15; 5 to 7½ tons, $20; 7½ to 12 tons, $25; trailers, including load, less than 5 tons, $3; 5 to 12 tons, $5.

Rhode Island—Carrying capacity 1 ton or less, $7, with $3 additional for each ton to 4 tons, and then $4 for each ton above 4 tons; over 9-ton capacity, $40 each; trailers, $10 to $30 each.

South Carolina—All $1 each.

South Dakota—No registration required.

Tennessee—All motor trucks $5.

Texas—All 50 cents each.

Utah—$10.

Vermont—First registration, $1 per hp.; second, 75 cents per hp.; third registration and thereafter, 50 cents per hp.

Virginia—40 cents per hp.

Washington—Automobiles and buses for hire, 50 cents per hp.; motor trucks under 2 tons capacity, $10, plus $5 for each additional ton up to 5 tons; motor trucks for hire, double above rates.

West Virginia—All $10 each.

Wisconsin—All $5 each.

Wyoming—Registration not required.

BRIDGING DRAINAGE DITCHES.*

The bridging of drainage ditches presents special features to be considered in selecting the type of bridge. Several of these features are especially favorable to the use of reinforced concrete pile substructures.

Bridges over drainage ditches require a relatively greater amount of excavation work to place the footings of reinforced concrete abutments below the bed of the stream than the ordinary bridge and the elimination of practically all excavation work by using concrete pile substructures is especially advantageous with these bridges. Another feature in this work is the necessity for rapid construction, as a number of adjacent highway crossings may be blocked and it is impossible to reroute traffic. When concrete piles are used, they can be molded in advance and driven as soon as the ditch is excavated. The entire substructure may be completed in much shorter time than would be required with the ordinary types of abutments. In some cases the piles may be driven in advance of the construction of the ditch.

A special condition that may be taken advantage of where there are a number of bridges in one locality is that a contract can be let for them in groups, making it economical for the contractor to use a heavy pile driving outfit and eliminate the hand labor excavation work.

The type of pile adopted by the Minnesota Highway Department is 14 inches square with no taper and reinforced with a rod in each corner and with a wire mesh. Enough of these piles are driven in each bent to carry the dead and live load with the piles figured to carry 20 tons each. A cap is cast which surrounds the tops of the pile and supports the superstructure. The cellular slab type of concrete bridge (described in the June 7 issue of Municipal Journal) is frequently used on this work.

For locations where a removable superstructure is demanded to facilitate later cleaning of the ditch, steel beams can be used and a floor slab cast without bond on their top flanges. The slab is divided into 7 or 8 ft. lengths so that the sections can be skidded off the ends of the beams and the beams removed temporarily.

*From a paper by C. E. Nagel before the Affiliated Engineering Societies of Minnesota.

HANDLING STONE FOR A SPRINKLING FILTER

Details of Plan Adopted at Sewage Disposal Plant at Fort Benjamin Harrison—Force Employed and Amount Placed Daily.

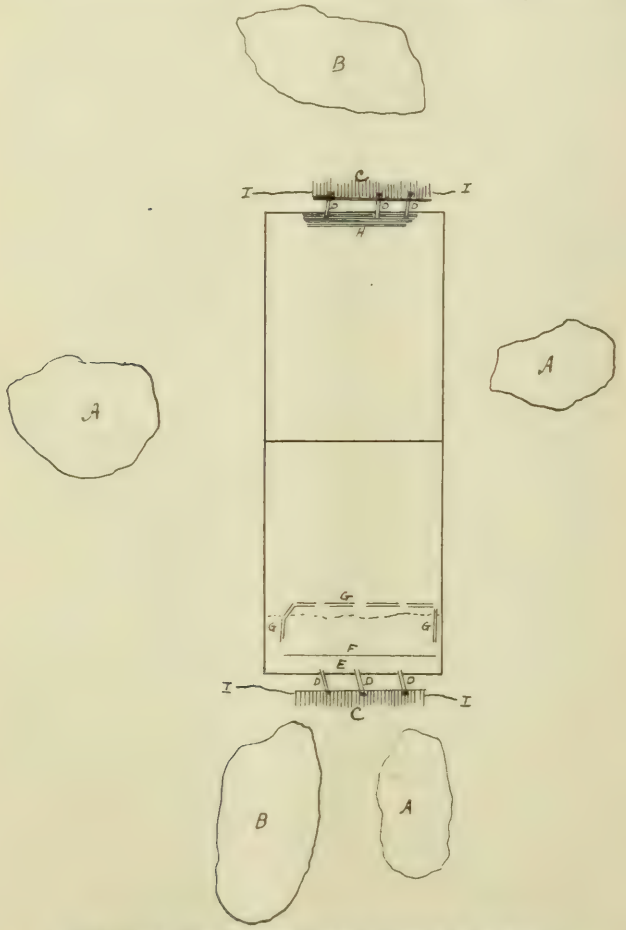
The handling of the stone for a sprinkling filter of a sewage treatment plant is a different problem from the ordinary one of handling broken stone, especially in these days when materials must be purchased far enough in advance to be sure to be on time and so may require storage and an extra handling or two.

The method of handling stone used by the Gaylord Engineering and Construction Co., under the charge of A. B. Dunning, chief engineer, in the construction of the sewage treatment plant at Fort Benjamin Harrison, near Indianapolis, Ind., is here described to show how the conditions were met and the stone was placed in the filter beds clean and clear and in the two layers required, the lower 2½ feet being of 2 to 4-inch stone and the upper 2½ feet of 1 to 3-inch stone. The company is working under the force-account system and is paid a percentage of profit on the payroll, which is made strictly on Union Labor schedules, so that the company has no control over wages but only on the number of men employed. Indeed, it is often necessary to work with less than the economical number of men on account of the difficulty of securing all the labor desired. A count or two of the number of men employed is given as a means of judging whether there is an excess in the number used.

About 3,000 cu. yd. of stone were required, when allowances are made for losses all the way along the line from quarry to place in bed, the filters being 194 feet long over both beds, 75 feet wide and 5 feet deep. Most of this stone was delivered in hopper-bottom cars, averaging about 50 tons in each car. A small amount came in smaller gondolas out of which the stone was shoveled, but these cars were objectionable because of the difficulty of getting into them, as it required 1 to 1½ hours to get down to the bottom at the ends of the cars before easy shoveling could be done into the wagons alongside. Forks were used largely in handling stone, on account of the necessity of having the stone free from fine material of all sorts. Every handling and the weathering in the storage piles made a certain amount of fine material, so that the fork was used at every handling. This fact and the further facts that the stone consolidates in cars and in piles and the piles sink into soft ground under their own weight produce difficulties in handling which are sometimes not appreciated and make the handling cost more than it is ordinarily estimated in bidding. A good quality of coke-handling fork costing about $18 or $19 a dozen does the best work. Forks with ten tines handle either grade of stone satisfactorily, but the fork with eight tines seems to handle the smaller stone, 1 to 3-in., the best.

Stone delivered in hopper-bottom cars was handled readily. A platform was placed under the car a few inches above the surface and the hopper-bottoms were then dropped. Two or three wagons could be placed alongside each car, three being accommodated easily by the largest cars. With three wagons on each side of a car and two men shoveling into each wagon, a car of stone could be loaded into the wagons quite quickly, such a car holding about 35 wagon loads. The shaking of cars during transportation worked the fine material down into the hoppers so that the first stone taken out was handled with forks and they were used liberally throughout the unloading of the cars. Forty-five teams and 36 men handled 8 to 9 cars a day with forks, making the cost $1.60 to $1.80 a cu. yd.

The filter beds are set with the long dimension across the valley in which they are located and there is at each end a small amount of cut into the bank which gives a steep slope down to the beds from an elevation 10 to 15 feet above them. The smaller stone was stored in piles on these elevations. Also as much of the coarse stone as there was room for was stored at one end. The remainder of the coarse stone was stored in two piles as close to the bed as possible down in the valley on each side of the beds, so that it could be wheeled in wheelbarrows to place with as little travel as possible. Grab-buckets could not be used unless screens were installed to take out the fine material and a second handling would have been necessary. The handling with forks into the wheelbarrows, which dumped exactly into place, was therefore preferred.



LAY-OUT OF STONE DISTRIBUTION PLAN.

A-A—Piles of the larger stone. B-B—Piles of the smaller stone. C—Platforms at top of bank. D—Chutes. E—Handling space for stone. F—Runway for barrows loaded by men in E. G—Planks for runways up to and over stone layer for barrows to dump. H—Platform on top of finished filter bed to receive stone from platform above and load on wheelbarrows for distribution over bed. I—Top of bank.

For handling the stone from the storage piles on the hills, platforms were built which gave openings into three chutes, which delivered the stone for the bottom course on the concrete bottom of the bed. In like manner they delivered the smaller stone on a platform on the top of the completed end of the bed. In the former case the wheeling was up hill with an elevation of 2½ feet and in the latter down hill the same amount. It was found that the stone had consolidated in the piles so that it was difficult to load it into the horse scrapers which were used to carry it to the platform and chutes. Sometimes it was necessary to stir up the surface with a plow before the scraper could be used successfully. Fine material in the stone due to handling and the action of rain water was accused of much of this consolidation, and possibly some of the fine material was due to too much use of the shovel in unloading cars. There is a source of expense in handling here which may be overlooked in estimating. The slope of the chutes can not differ much from the vertical as the large stone does not move easily over plank surfaces.

To reduce the danger of fine stone getting through the platform on to the filter bed, the smaller stone is forked from the pile into wheelbarrows to carry to the chutes, instead of using the horse scrapers. The stone is again forked into barrows at the bottom of the chutes, but there is less fine stuff to get rid of.

All the stone delivered at the bottom of the chutes was forked into several piles arranged in a row across the end of the bed. The fine material remaining was wasted as filling behind the concrete wall at the end and side of the bed.

To carry the stone from the small piles to place in the bed, a row of 14 or 15 men was kept moving constantly along a lane past the piles, up an incline to the top of the layer of stone, along a plank runway to place of dumping designated by one man in charge. From 9 to 14 men stood at the small piles and each dumped a forkful of stone into a barrow as it went by. Not every man forked into every barrow, but by the time a barrow man had passed the lane he had about a half-barrow of stone, about all he could handle easily and dump properly. One man spread what little amount was necessary to keep the surface of the stone level and to grade.

The day shift includes 5 scrapers; 14 forkers and shovelers on platform and down chutes; 17 men at bottom of chutes, forking, wasting fine material and loading barrows; 14 barrows; 1 unloader; 1 spreader; foreman, and water boy.

An exact measure of the work done was furnished by Mr. Dunning. The night shift, working 10 hours regular pay, consisted of 32 men, 1 foreman, and 2 scrapers. The amount of stone placed was 73x30x2½ ft. or 203 cu. yd. As 14 barrows were used and 9 men loaded them, most of the difference from the day force was on the storage pile and at the bottom of the chutes. Teams cost 80 cents an hour and labor 35 cents, so that the cost of the 203 yards was $133 or 65½ cents a cu. yd. The night shift probably handled more stone per man than the day shift.

MINNESOTA ROAD PLANER.

An appliance developed from the King road drag is being used in the central states for gravel and dirt road construction and maintenance, which is said to be less liable to gouge out soft places and, with its side supports of comparatively great length, fills up depressions in the surface without any special effort on the part of the driver. They are built 5 ft. wide and 12 ft. long, 2-inch timbers being used throughout. The blades are shod with metal. It is used in many counties to spread dumped gravel evenly over the road.

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THE COST OF PUBLIC WORK.

Several times since the United States entered into the war we have expressed our opinion that cities, counties and states should continue to carry on public works as usual, at least such as are necessary to maintain and increase the health of the people and the efficiency of their various enterprises as compared with those that are largely ornamental. It can hardly be expected that the cost of such work will not be greater than in previous years, but on the other hand such cost does not seem to have advanced by so high a percentage as that of many or most other materials and services; in other words, public work is being done at relatively low cost.

An especially favorable report in this respect is received from Utah. It was stated recently, in connection with a discussion on the advisability of building certain roads this year in that state, that "never before in the history of the state has road construction been done so cheaply as it is at present. The Beck street road in North Salt Lake is being built for less money than any other concrete road ever constructed in the state. An asphalt contract let in Ogden recently broke the low cost price record for that kind of construction." While such favorable conditions can not be expected everywhere, this and other instances of low costs would indicate that many officials probably are being unnecessarily deterred from putting through public work by a fear that the cost will be excessive.

For those who are holding off in the hope that lower prices may be obtained in a few months, there is little encouragement for believing that such hopes will be realized. Prices of some materials that are now exorbitant will probably be lowered, but the general average can hardly be expected to fall at all before the end of the war, and may rise, and even after the conclusion of hostilities, a world-wide demand for material and skilled labor will probably continue for at least a year or two which will tend to maintain the cost of these well above the level of antebellum conditions.

COMPETITION FOR PUBLIC WORK.

Not for years, probably, have Americans, as a nation of individuals, been so economical as during the past few months. This does not mean that they have been depriving themselves of necessities, but that they have purchased more carefully and been less wasteful.

Municipal governments should follow suit. Officials should take more pains to obtain the best prices possible without sacrificing quality, and to make sure that they are getting what is most suitable to their needs. This will require a little more consideration and attention to details on their part, but it is their duty as public servants to contribute these. It may necessitate withholding orders or contracts from personal or political friends if others can be found who will give the city more favorable prices, but this is their duty now more than ever.

To obtain the lowest possible prices involves securing offers from all who are willing to furnish the desired goods or service; and in almost every case this requires that public invitation for bids be brought to the attention of all probable bidders. More and more cities are doing this instead of merely notifying a list of local contractors, and they are finding that the cost of such advertising is insignificant compared to the saving in the cost of the work secured by the wider competition. This is especially true at present, when so many are apparently boosting prices because of personal greed rather than of any business necessity.

Public work can still be done at reasonable prices, but not all prices now being asked are reasonable, and those that are not should be forced out of the running by wider publicity and competition.

WHERE MUNICIPAL OWNERSHIP IS A FAILURE.

A request for information concerning a waterworks plant in a small city brought us the following reply: "Records have not been kept for a good many years. There is no record of the number of miles, rods or feet of pipe, the sizes, connections, gates, etc. Over one hundred meters are out of fix and not running. Meters have never been examined since the first one was put in, unless one got broken by freezing or some accident. There is talk of combining the offices of water commissioner and chief of police at a salary of $25 a month."

Decision as to whether or not municipal ownership is a success is generally made largely from a business viewpoint, and any business run in the way indicated by the above reply could not be expected to succeed. If a municipality is not prepared to give to the operation of a public utility, and especially one that involves the health as well as convenience and pocketbooks of its citizens, at least as much intelligent attention as is required to run a corner grocery successfully, then it had better let municipal ownership alone and make the best terms it can with a private corporation to provide the public necessities and conveniences.

Municipal ownership is foredoomed to failure when it is neglected and mismanaged; but almost any city can make it a success if it will run it on sound business principles.

PERMANENT ASSESSMENT BOARDS

To Act in Street Opening and Widening Cases—Laws and Practices in Eight Large Cities—Law Proposed for St. Louis.

By ANDREW LINN BOSTWICK.*

The City Plan Commission of St. Louis has completed plans for an improved system of major, or principal, thoroughfares for the city. This plan has already been described in Municipal Journal.

It was found that state legislation on a number of points will greatly facilitate the carrying out of this street plan, and every effort will be made to obtain the powers desired.

One of the city's needs in this respect is a permanent assessment board to act in all condemnation cases, particularly in opening and widening streets. At present, three commissioners in each case are appointed by the courts. A permanent board of experts, high-salaried if necessary, would be a powerful factor in the prompt disposal of all condemnation suits.

The Commission made a brief study of existing laws and practices, and a summary of this, together with the text of a proposed law on the subject for St. Louis, is given herewith:

Philadelphia—(Act of Assembly, June 23, 1911.)—Board of Viewers of 9 members, appointed by Court of Common Pleas for 3-year terms. Salary, $5,000. Upon petition the court appoints a "Board of View," consisting of 3 members, from the Board of Viewers, one of whom must be learned in the law, to assess benefits and damages and report thereon.

Boston—(Municipal Register, 1915.)—Board of Street Commissioners consists of three members appointed by the Mayor. One duty imposed upon the Board is the assessment of benefits and damages.

Baltimore—(Charter 1915, part of Secs. 172-195A.)—The Commissioners for Opening Streets, three in number, are appointed by the Mayor. They must assess benefits and damages. Appeal may be had to the city court.

Milwaukee—(Charter, 1914, Ch. VI.)—The courts appoint a jury to report on the necessity of taking property, but the Board of Public Works assesses the benefits and damages. In Andrews vs. Oshkosh, 84 Wis. 566, it was held that the board of public works of a city, acting under oath, was a fair and impartial tribunal to assess benefits and damages. Appeal may be had to the Circuit Court.

New Haven, Conn.—(Charter, Secs. 76-81, part.)—The Department of Public Works has a Bureau of Compensation, at the head of which is a Board of 3 commissioners, bi-partisan, appointed by the Mayor for 3-year terms (over-lapping) at salaries not exceeding $300 per year.

The Bureau of Compensation holds hearings in street opening cases, assesses benefits and damages, and reports to the Board of Aldermen, which body may make revisions.

Oakland, Cal.—(Charter, 1910, Sec. 51, 47.)—In street opening proceedings the city attorney and the street commissioners direct the work usually performed by special commissioners in assessing benefits and damages.

San Francisco, Cal.—The Board of Public Works assesses benefits and damages in street opening and street widening cases.

St. Paul.—The Board of Public Works assesses benefits and damages in street opening and street widening cases.

St. Louis, Mo.—(Proposed Law.)—An Act Granting Authority to Any City in This State Now Having or Which May Hereafter Have 400,000 Inhabitants, to Provide by Ordinance or Charter Provisions for the Appointment, Term of Office and Removal of a Board of Assessment Commissioners Who Shall Have the Power to Assess Benefits and Damages in Condemnation Proceedings.

Be It Enacted by the Senate and General Assembly of the State of Missouri, as follows:

> Section 1. Full power and authority are hereby given and conferred upon every city of this State which now has or may hereafter have 400,000 inhabitants to provide for the appointment, term of office and removal of a Board of Assessment Commissioners, who shall constitute a permanent board for the assessment of benefits and damages in condemnation proceedings instituted by any such city; and such provision may be made either by charter provision therefor adopted by the people of said city, according to the law, or by the people thereof under the power of the initiative.
>
> Sec. 2. It shall be a feature of all such laws or ordinances that said Board of Assessment Commissioners shall be a permanent board who shall sit from day to day and assess benefits and damages in condemnation proceedings as may be provided by said city as aforesaid.
>
> Sec. 3. Said city shall have power by ordinance or charter provision to fix the number of said commissioners constituting said board, their terms of office and the manner of their appointment, and the manner in which they shall discharge their duties.

*Secretary, City Plan Commission, St. Louis, Mo.

TOPOGRAPHIC MAP FOR BEVERLY.

In presenting a report recently to the Planning Board of the city of Beverly, Mass., A. C. Comey laid emphasis upon the desirability of a proper topographic map of the city. Such a map had been prepared on a scale of 800 ft. to an inch by the city engineer from existing maps, but this was not believed to be sufficiently accurate and it was recommended that a precise survey of the city be made as a basis for a new map. It was recommended that the system of coordinates be used for locating points within the city, the axes passing through the extreme western and southern points of the city's boundary.

The map would probably be drawn to as small a scale as 200 ft. to an inch, but enlargements could be made for special purposes when necessary. To permit filing flat in drawers, it should be divided into sheets not exceeding 3 by 4 ft. over all, including a margin and slight overlap of each sheet. As all the topographic data will not be necessary for each of the purposes for which the map will be used, a tracing should be made of the original map showing simply the coordinates, boundaries, shore lines, railroad center lines, street lines, and boundaries of city property.

From such a tracing an assessor's map could be prepared, on which would be placed all property and lot lines, building lines and other easements and restrictions. Each block and each lot could be numbered and the map kept up to date by reference to the recording of deeds.

In the congested areas it may be found necessary to enlarge these maps photographically to a scale of 100 or even 50 ft. to an inch. Other departments may desire to use such outline maps for indicating location of water and sewer pipes, types of pavements, location of poles and wires, etc.

The complete topographic map should include levels and grades, contours at 5-ft. or 2-ft. intervals, fences, buildings, railroad and street car tracks, curbs, parkings, monuments, and the character and treatment of public property and other large tracts (roads, paths, fences, water-ways, swamps, rocks, large trees, woods, etc.). These should be kept up to date by occasional field work. Rural sections not likely to be built upon need not have all this information mapped in advance of need for it.

All construction plans on a large scale should be based on this map and enlargements from it, which need only be corrected when actual work is to be done. For general city-wide studies, a reduced copy should be made at a scale preferably of 1,000 ft. to an inch. For clearness many of the data may be omitted, but public buildings and contours at 5 or 10-ft. intervals should be shown.

In the report of which the recommendation above abstracted formed a part, Mr. Comey also submitted a map showing the public and private uses to which the city's area is put; another showing the distribution of population over the city; and a third showing the variation in assessed land values.

The WEEK'S NEWS

State Highway Developments in California, Pennsylvania and Texas—California's New Sanitary Laws—United States Makes Cantonments Safe for Soldiers and Citizens—New Jersey River Pollution Suits—San Francisco's Water Rate Case—Voters Won't Lower Gas Rate in Cincinnati—No Higher Rates for Missouri Utilities—Police in East St. Louis Found Responsible—Fires in Sumpter, Ore., Lebanon, Ill., and New York City —Lansing's Piggery—Garbage Collection in New York, Pocatello and Flint—Strikes Tie Up Cars in Kansas City, Butte and Lima.

ROADS AND PAVEMENTS

Prohibit Traction Engines on Paved Streets.

Springfield, O.—A fine of not less than $25 nor more than $100, is the penalty fixed by an ordinance passed by the city commission for running a traction engine, road-roller, or any other heavy vehicle or machinery having cleats, spikes, or like projections on the wheels over the paved streets or street crossings of the city. Before any such vehicle or machinery is moved over any part of a paved street or street crossing, application must be made to the city manager for a permit which will be issued when the case so warrants. This permit shall specify the route over which the vehicle must pass and the method of protection which shall be used over which the cleated or spiked wheels pass. The ordinance is so worded that it will probably include all heavy machinery regardless of the kind of wheels.

Counties Get Vehicle Receipts.

Sacramento, Cal.—The sum of $1,187,497.62 will be distributed to the counties of California as their share of the receipts from the registration of motor vehicles for the six months ending the first of July, according to H. A. French, superintendent of the state motor vehicle department. The total receipts were $2,554,817.65, the net receipts $2,521,355.60, and the counties' pro rata of expenses, $146,360.37. Los Angeles, with 78,143 autos and 7,501 motorcycles registered, gets the largest share, $374,061.80, with San Francisco second with 25,917 autos and 1,692 motorcycles and a cut of $132,794.64. Sacramento's share was $31,958.45. The same department has prepared a statement showing the registration of motor vehicle dealers for the state. It shows there were 250,660 autos in the state on July 1, 23,863 motorcycles, 11,213 chauffeurs, 2,149 auto dealers and 153 motorcycle dealers.

Highway Commissioner Ousted.

Harrisburg, Pa.—Frank B. Black, state highway commissioner, has "resigned" at the request of governor Brumbaugh. Action by the governor in asking for Black's resignation followed the publication of details of the censorship placed upon a proposed statement of the highway department regarding an equitable division of the state funds for county road work. The governor demanded a look at the proposed statement, then withheld it from publication. The commissioner made it public when he resigned, stating that the public may be the judge whether he is right or wrong. In his letter of resignation, commissioner Black says: "The reasons as set forth in your letter, especially those pertaining to the manner of oiling roads, are so ridiculously small and insignificant that they are not worthy of a reply. The policy of the department as to the distribution of its funds has been announced from time to time, as you know, and is well known to the public, that policy being that the money would be divided equitably and that each county would get its just proportion. I gather from your letter that you do not desire to treat the counties fairly and evidently wish the money parceled out to favorites. The fact that many counties have offered to meet the state on a 'fifty-fifty' basis in the construction of state highway routes is an indication that the state highway department has the confidence of the public, and if the money appropriated is to be used for political purposes it will subject the department to endless criticism and will be a crime for which you and your political advisors will have to answer. Since I have been in office there has been no mystery with the highway department and its work has been known to you as well as to the public generally. The way I look at this proposition is that all the statements made by you are made with a view of beclouding the real issue for requesting my resignation. It has been my aim to run the department along business lines instead of being used as a political asset. I have refused consistently as is well known both to yourself and your close political associates, to turn the department into a political machine. At your own personal order, contrary to the judgment and advice of the department, I appointed four superintendents whose appointments were insisted upon by you solely for political reasons, to take the place of men of experience, and in each case these appointees very soon realized their inability to handle the work and resigned voluntarily, which simply illustrates what it would mean if the work of the department were handled along political lines. Continuous efforts have been made during my administration to force changes and removals for political reasons, the practice of which I could not countenance. Such methods tend to completely demoralize any organization, cannot help but cause financial loss in handling work, because of constantly changing ineffective and inefficient personnel, and in this way the department must lose the confidence of the taxpaying public."

Honolulu Wants to Be on Lincoln Highway.

Detroit, Mich.—The latest and most unique claim for a place on the trans-continental highway comes from far Hawaii where local enthusiasts now announce Honolulu as being the western terminus of the Lincoln Highway rather than San Francisco. Not the Golden Gate, but the famous Nuuanu Pali, six miles above Honolulu, a precipice overlooking one side of the Island and considered one of the most spectacular views in the world is advanced as being the western goal of America's trancontinental motorists, and it is true that hundreds finishing their transcontinental drive now embark for the Hawaiian Islands, there to complete their season's tour. Ambitious Hawaiians now aspire to make their home a terminus for other great automobile routes and a party from Honolulu headed by E. H. Lewis, pioneer automobilist of the Hawaiian Islands has just landed at Seattle to log the road from that point to San Francisco, and from San Francisco to drive on Lincoln Highway to Chicago, where they expect to arrive late in August. The cars will be decorated with Hawaiian pennants and Mr. Lewis and the other prominent Hawaiians will carry letters from mayor Lane of Honolulu to the mayors of San Francisco, Chicago, New York, and intermediate cities along the Lincoln Highway.

Half Auto Fees to Counties.

Austin, Tex.—The attorney general's department has rendered an opinion to the state highway department that the one-half of the registration fees remitted by the highway department to the respective counties is to be expended by the counties upon highways of the counties, after the submission to and approval by the state highway commission of the plans of the contemplated expenditures. To the commissioners' courts of the various counties is given the direction and control of the expenditures of the fund, but in such expenditure they are limited by the further provision of the act, that the same must be upon plans approved by the highway department. "Any other interpretation of this section of the act would be to defeat the general scheme and purpose of the same, to wit: A

co-ordinated system of highways, together with the local or market roads leading thereto," says the opinion. "This allotment from the state highway department does not become a part of the general county road and bridge fund, but remains as a special fund, to be expended in the manner set out by the act creating same. When the commissioners' court desires to make an expenditure from this fund they should designate the roads, the character of maintenance desired and submit the plans in detail to the state highway department and upon their approval or disapproval would depend the right of the commissioners' court to proceed with the work."

SEWERAGE AND SANITATION

Control of Health Board Budgets.

Columbus, O.—"Estimates of expenses for local health officers and boards of health are subject to review by the county budget commissioners and may be reduced as well as other items in the budget when this is necessary to bring the total for any taxing district within the limits provided by law. The council of a municipality must appropriate funds sufficient to pay compensation fixed by the board of health for its employes provided there are funds from which such appropriation can be made." These summarize an opinion given to the state department of health by attorney general Joseph McGhee in response to the following questions asked him: "1. What, if any authority has a municipal or county budget commission to reduce the estimates submitted by a board of health—including compensation for employes and other administrative expense? 2. Is there any procedure whereby council can be compelled to appropriate a sum sufficient to pay the compensation fixed by a board of health for its employes without compelling the individual employe to maintain an action in mandamus?" As authority for the first proposition the attorney general cites the case of State ex rel Patterson, 93 O. S., 25, in which it is held that the budget commissioners may adjust the various amounts of taxes to be raised and may reduce any or all items in such budget and, in the absence of fraud, bad faith or abuse of discretion, it is not within the power of the court to interfere or control the discretion or judgment of such budget commissioners. As to the second proposition the case of State ex rel. Miller v. Council of Massillon, 20 C. C. (n. s.) 167, is cited in which case the court held that it is mandatory upon council to make the necessary appropriation to meet the expenses of a health officer and a board of health, and that mandamus will lie to compel an appropriation for such salary and expenses under the provisions of Section 4451 G. C.

New Sanitary Laws in California.

Sacramento, Cal.—Important new health laws affecting hotels, rooming houses, restaurants, saloons, soda fountains, bath houses and other public places are now in effect. The new provisions, which were passed by the last legislature, are known as follows: Senate bill No. 92, preventing the keeping of towels for common use in public places; senate bill No. 640, providing for the sanitary regulation of hotels; senate bill No. 91, to prevent the common use of drinking cups in public places; assembly bill No. 141, providing for the healthfulness, cleanliness and safety of swimming pools and bath houses. Penalties are prescribed for the violation of any of these acts. The law dealing with the common use of towels sets forth substantially that any hotel, restaurant, factory, barber shop, office building, school, railway station, etc., maintaining towels for the use of more than one person without being washed or sterilized after each consecutive operation, will be guilty of a misdemeanor and be liable to a fine not exceeding $25 for each offense. What is known as the "bed sheet act" deals with the sanitary condition of hotels, requiring clean bed coverings, the rooms to be well ventilated and kept clean, the sheets at least 81 inches by 91 inches for full beds and at least 50 inches for single. Any owner, manager or lessee who fails to comply with this act will, on conviction, be fined not more than $200, or imprisoned for not more than three months. Any person who violates the provisions of the public "drinking cup" act will be guilty of a misdemeanor and be liable to a fine of not more than $25. This act makes it unlawful for any person, firm or corporation who conducts a hotel, saloon, soda fountain, store, theatre, church, club, train, etc., to allow to be used in common any receptacle for drinking purposes without its being thoroughly washed after each use. This law further makes it compulsory for a cask, water cooler or any vessel used for storing or supplying drinking water to be covered or protected to keep people from dipping out the water. Concerning the bill dealing with swimming pools and public bath houses, and which regulates the granting and revocation of permits and the inspection of these places, it is specified that no person may construct and operate a bathing place without obtaining an unrevoked permit from the state board of health. It also provides specific means whereby a permit may be alone acquired, if at all, through the submission of plans and specifications to the board with the accompanying application. Every detail that assists in making a bath house or swimming pool sanitary and safe must be gone into. For a violation of this act the penalty is not less than $25 and not over $500 or six months' imprisonment, or both. The state board of health is proceeding with the enforcement of these health laws and has directed all local health officials to get into immediate touch with the persons, firms and institutions affected and to apprise them of the requirements and changes necessary in order to comply with the new regulations.

Health Protection in Cantonment Cities.

Washington, D. C.—Col. H. C. Fisher, of the Surgeon General's Office, has been making a tour of sanitary inspection of the cantonments in the southeastern department, including the states of North Carolina, South Carolina, Georgia, Alabama, Mississippi, Tennessee, Louisiana and Arkansas. The Surgeon General plans to have general sanitary inspectors connected with his office make careful inspections of all cantonments in order that he may know at first hand the actual conditions and take timely steps to remedy any defects in sanitation.

Columbia, S. C.—Sanitary units, under the supervision and authority of the state board of health, will be established at the three South Carolina military camps—Jackson, at Columbia; Sevier, at Greenville, and Wadsworth, at Spartanburg —according to Dr. J. Adams Hayne, state health officer. Appropriations for the maintenance and prosecution of the work will be made by the American Red Cross. The amount for the work at Camp Jackson—$10,000—has already been appropriated and a check for it received by Dr. C. Gadsden Guignard of Columbia, who has been designated as business agent for the disbursing of the fund. "The state board of health's funds, as well as the county funds, are appropriated by the legislature for specific purposes," stated Dr. Hayne. It was therefore necessary to get funds from some other source. These funds were secured from the American Red Cross. The general plan as outlined by the United States public health service and the American Red Cross is the establishment of thorough and effective sanitary control systems around army cantonments and other military points. This will be done by making a preliminary survey to determine the existing conditions and what additional measures and organization will be necessary to establish sanitary control. Units will be established in these zones to consist of one bacteriologist, one chief sanitary inspector, from two to six public health nurses, from two to six sanitary nurses, necessary laboratory attendants and clerks and such other additional personnel as may be necessary to meet any special need which may arise. "The plan agreed upon by the United States public health service and the American Red Cross," continued Dr. Hayne, "was that a department camp environment sanitation of the state board of health should be formed, with an officer of the United States public health service in charge, who would be under the direction of the state board of health and clothed with its authority, and that other officers should be detailed at the camps at Greenville and Spartanburg to be in charge of the units stationed there." Around the Columbia cantonment will be created a one mile zone free from the mosquito carrier of malaria.

Rockford, Ill.—Medical authorities of Camp Grant at

Rockford have ruled that temporary ice cream and pop stands and hurry up restaurants must go and that a health zone of several miles around the camp will be established. They are doing this as a precautionary measure to insure the health of soldiers and the same steps are likely to be taken soon by Camp Custer, Battle Creek, Mich., authorities.

Houston, Tex.—Outlining a clean-up campaign, city health officer P. H. Scardino said: "The overnight increase of Houston's population by 35,000—a city in itself—requires prompt and vigorous steps to safeguard the public health. We have been very diligent in the past, but redoubled efforts will be required. The big thing is in guarding against a possible spread of typhoid fever and the keeping down of malaria. When 35,000 men are quartered together, a few scattered cases of typhoid may spread to an alarming degree—and that is just what the army is going to keep down. But the army's jurisdiction ends at Camp Logan's borders, and it will be our work to have the surrounding community clean, and to see that milk and food supplies are absolutely clean. If the fall and winter are comparatively dry, the keeping down of malaria will be greatly simplified. The health department will have a morbidity map, with pins of different colors to define the location and character of different reportable diseases. We can thus keep the city divided into zones." A preliminary health survey was made by Dr. A. W. Freeman of the United States health service, assisted by J. K. Hoskins, a water and sewage expert. Many new inspectors have been added to the regular city force. The city and army authorities will require that all surface toilets in the city be either connected with the sanitary sewerage system or be made flyproof. Standardized plans, calling for a cheap but effective type of construction, will be furnished by the health office. In addition, the city will require the draining of back yards to remove breeding places for flies and mosquitoes. And the inspection of milk will be very rigid. The health officer will ask the council for authority to buy a motorcycle for one of the two inspectors, and will keep these experts continually on a round of the dairies supplying both the troops and civilian trade.

Hattiesburg, Miss.—Following meetings of citizens addressed by Dr. J. A. Watkins and J. A. LePrince, of the United States public health service, and Dr. W. S. Leathers, director of health of Mississippi, the community has been aroused to an aggressive clean-up campaign. City commissioners and county supervisors are endorsing the movement and providing funds. Work is now well under way. Commissioner L. C. McAuley put a large force of men to work to clean and drain Gordon Creek. Passed assistant surgeon J. A. Watkins directed the work of the men. J. A. LePrince, the malaria expert, started work on the mosquito breeding places. Dr. Watkins was made director of public health for the civil district and the extra cantonment area. This title was given him by Dr. W. S. Leathers, state health officer, Dr. H. T. Mounger, county and city health officer, and the general welfare committee of the county. The work of ditching and draining will be extended to cover the entire city and county. Oiling machinery was ordered by telegraph and put to use immediately on arrival. The city authorities have passed an ordinance requiring all owners of places of business to put wooden or galvanized iron boxes in the rear of their places of business for the collection of all trash, paper, decayed fruit or vegetables. The ordinance defines the dimensions of the containers and orders they must be properly covered. Violations of the ordinance will result in prosecution. Fines ranging from $1 to $10 may be imposed. The installation of a system of garbage collection in Hattiesburg was then announced by Dr. J. A. Watkins. Twenty inspectors were engaged in a house to house canvass of Hattiesburg, indexing the health conditions found in each family. After six hundred cards were turned in to Dr. Watkins, he said: "These cards show an astounding lack of sanitation in the homes of Hattiesburg. We thought the clean-up would be municipal, rather than individual. I find, however, that in 90 per cent. of the homes visited by the inspectors, radical improvements must be made. It seems as though our work will have to be extended to many private kitchens in Hattiesburg." According to the cards on file in Dr. Watkins' office, the majority of the homes inspected lacked garbage cans. The cards show that a large number of surface closets are not screened. Many houses were also found to be inadequately screened against flies and mosquitoes. Dr. Watkins personally inspected every restaurant and cafe in Hattiesburg. He informed the managers of most of the establishments what changes must be made to protect the health of the public. In some instances these changes will involve considerable expense. All eating houses in Hattiesburg will be inspected daily. All state and city health ordinances will be rigidly enforced. Others will be promulgated as the occasion arises.

Begin on Last Passaic Valley Sewer Section.

Newark, N. J.—After a long delay caused by the abandonment of a contract, work on the last big link in the Passaic Valley sewer has been started by Charles S. Haskin of Boston, who was recently awarded the contract to complete the outfall pressure tunnel under Jersey City and New York Bay, originally undertaken by the O'Rourke Engineering Construction Company of New York. Haskin, it is expected, will complete the work before December 31. Part of the equipment left by the O'Rourke company at the Jersey City shaft has been purchased by Haskin, and it is understood that negotiations are under way whereby all available machinery and a dock left by O'Rourke will be taken over by the new contractor. Haskin's first work was at the Jersey City shaft, where he installed steam boilers to supply his own power for air pressure work required in driving the tunnel. At a recent meeting the sewer commission raised the salaries of twenty-one of its employees, none of whom had received an increase in the last two years. The raises total $6,280 a year.

WATER SUPPLY

Continue Diversion and Pollution Suits.

Trenton, N. J.—Answers have been filed in the Court of Chancery by Jersey City and the East Jersey, Acquackononk and Montclair Water companies to the suit brought by the National Silk Dyeing Company to enjoin these and other defendants, including Newark, from impounding and interfering with the flow of the Passaic River and its tributaries. The answers denied a number of the allegations made by the dyeing company. Assertion is made in the answer that the property rights of the defendants rather than those of the dyeing company have been impaired by the discharge of noxious sewage, chemicals and discoloring polluted matter into the river by the dyeing company. The answer sets forth that notwithstanding the diversion and impounding of water complained of, there has always been a sufficient flow of water past the dyeing company's works for reasonable riparian uses. The fact that the dyeing company ceased to take water from the Passaic some years ago was not, it is charged, because of insufficient water available for its purposes, but because the water had become unfit for use through pollution caused by Paterson and other dyers and manufacturers along the banks of the river. An answer filed by the law department of Newark in the chancery action brought by the Weidmann Silk Dyeing Company of Paterson, to enjoin the alleged unlawful diversion of water from the Passaic River, sets out these major reasons why the relief sought should not be granted:

That it was a matter of common knowledge in Paterson and elsewhere prior to and during the construction of Newark's present water supply system that as a result of the taking of water from the Pequannock watershed the flow of the Passaic would necessarily be substantially diminished; that the complainant concern with full knowledge of that fact "stood mutely by," permitting Newark to expend the large sum of $6,000,000 in the erection of its works, and hence it is estopped from now obtaining an injunction against this defendant, if any it has under the circumstances."

That the complainant company is one of a number of dyeing concerns in Paterson which are jointly polluting the Passaic River by discharging their sewage and chemical waste into that stream; that if it were not for that pollution, the cities of Newark, Jersey City, Paterson and Passaic and the various other municipalities that use the water diverted from the river could use that water and yet leave sufficient water in the river for all the legitimate uses of the dye houses and other riparian owners below the points of diversion. Newark submits, under these circumstances, that complainant does not come into court "with clean hands and should be denied any equitable relief on that account."

Lastly, the answer sets out that the Passaic River and its tributaries above Little Falls constitute the only available source from which water in sufficient quantities can be taken for the cities and towns of Northern New Jersey and that the supply is more than adequate, not only for the present, but for all future needs within the bounds of reasonable forecast, provided the waters are properly impounded and protected from pollution; that all the water now taken by Newark is taken under legislative authority for public use of an imperative character.

The answer denies that the undiminished flow of the Passaic at complainant's plant is a large or anything but an insignificant element of value in the plant; that the diminished flow due to the diversion complained of has greatly or appreciably diminished the value of the plant; that the natural flow of the river, but for the impounding, interruption and diversion, would have carried away the noxious material deposited in the river, and that such diversion, if continued, would greatly lessen the value of complainant's premises for any use to which they might be put.

The bringing of the chancery action by the Weidmann company is a new departure on the part of that concern, following a set-back it received in a common law action at the hands of the Court of Errors. In a number of suits brought by the Weidmann concern and other Paterson dyeing companies sizable awards were recovered against this city, some of which were ultimately cut down, however. When Harry Kalisch became city attorney January 1, 1915, he found a number of such suits brought by the Weidmann company and other dyers against Newark and other takers of water from tributaries of the Passaic pending, and took steps to combine them all. The case was then tried before Judge Silzer in the Passaic Circuit and resulted in an award against several of the defendants, the court having eliminated from the consideration of the jury the diversions by the Passaic Water Company and the Morris Canal & Banking Company on account of their alleged prescriptive rights, and also the pollution of the river by Paterson and various other polluters. In that suit Mr. Kalisch raised the point that inasmuch as the Weidmann concern returned the water it took from the river after its use in a polluted state, the diversion complained of by that company did not constitute an "interference with its reasonable use of the water," and he asked that the jury be so charged. This request was denied, but the Court of Errors differed, holding, in an opinion by Justice Bergen, that the question raised was not one of law, but one of fact that should have gone to the jury.

Company Wins Steps Toward $2,000,000 Claim.

San Francisco, Cal.—Special master in chancery Harry M. Wright who had been hearing evidence in litigation between the city of San Francisco and the Spring Valley Water company, involving $2,250,000 impounded funds, has recommended that the company have possession of the money, in a report to the United States district court. The money represents the difference between the company's rates and those fixed annually by the municipal board of supervisors between 1907 and 1915. Special master Wright, in his report, contended the company's rates were just, and those fixed by the supervisors were confiscatory. His decision must be ratified by the court. The company claimed that "the rates were fixed arbitrarily and at random, or by guesswork, and were not based on the actual value of the property, but upon the mere whim of the Board of Supervisors." The city and county attorney will challenge the company's violation by claiming that it is greatly excessive, particularly as regards "going concern" value.

State Laboratory Tests of Water Supplies.

Charleston, W. Va.—Tests made in the state university hygienic laboratory at Morganstown by authority of the public service commission, covering the water supplies of 117 cities and towns of West Virginia show nine places having water that was found absolutely unsafe, and eleven places where the water is pronounced safe, according to the report made by chief inspector A. A. Shepherd, covering a period of one year ending June 30 last. The samples tested were taken from sources of supply, reservoirs, tanks, taps and wells, not from taps alone. The towns having water pronounced unsafe are Cairo, on Cabin Creek, Eskdale, Ethel, Gauley, Hundred, Ripley, Shepherdstown, West Union and Worthington. Water in use at Bluefield, Berwind, Ceredo (second utility), Follansbee, Gary, Harrisville, Leewood, Mt. Hope, Raleigh, Northfork and Widner is given a clean bill as pure and safe.

The report shows that out of 51 tests made of Charleston water from 11 shipments of samples, 27 were found safe, 14 unsafe and 12 suspicious, a total of 23.5 per cent unsafe; Huntington, 38 tests from 13 shipments of samples, 13 safe, 24 unsafe, one suspicious; total of 63.1 per cent unsafe; Ceredo, Kenova and Catlettsburg, 40 tests from 14 shipments of samples, 11 safe, 12 unsafe, 17 suspicious total of 30 per cent unsafe; Ceredo (second utility), 19 tests from nine shipments of samples, 19 safe; Elkins, 10 tests from three samples, two safe, seven unsafe, one suspicious; total of 70 per cent unsafe.

Fairmount, nine tests from four shipments of samples, two safe, two unsafe, five suspicious; total of 22.2 per cent unsafe; Wheeling, 97 tests from 14 shipments of samples, 52 safe, 36 unsafe, nine suspicious; total of 37.1 per cent unsafe; St. Albans, 35 tests from 11 shipments of samples, 12 safe, 18 unsafe, five suspicious; total of 51.4 per cent unsafe; Clarksburg, 28 tests from eight shipments of samples, 21 safe, six unsafe, one suspicious; total of 21.4 per cent unsafe.

The publication of this data brought protests from a number of cities. Superintendent Herman E. Watt, of the Huntington Water Company, sent a vigorous denial of the published conditions of the city's supply. Mayo Tolman, chief engineer of the department replied that there had been a mistake on the part of the public service commission employe. Inspector Shepherd of the public service commission explained that his report on the safety of the water supply of 117 towns and cities of the state had been based upon the total number of tests made by the bacteriological department. The misunderstanding, he said, came because he did not specify between the raw river water and the water after it has been treated and passed through the various filtration plants.

Vote in Favor of Water Franchise.

Clayton, Mo.—Voters at a special election have decided to grant a 20-year franchise to the West St. Louis Water and Light Co. in return for a 25 per cent reduction in water rates to the community. The vote on the proposition was 202 for and 41 against it, about half the normal vote of the suburb. The opposition was from those who held that the granting of a 20-year franchise to the company would rob the entire community of much cheaper water rates in the event of the annexation of Clayton by St. Louis, which they feel is inevitable in the near future. The changed rates for the community will make them uniform with those of Maplewood and University City. There are various scales of rates.

STREET LIGHTING AND POWER

Referendum Disapproves Council's Gas Rate.

Cincinnati, O.—Ratification of the ordinance of city council providing for a 35-cent gas rate for Cincinnati was refused by the voters at a special election by 9,544 votes. A total of 34,250 votes were cast on the ordinance proposition, 21,897 being against, and 12,353 for it. The vote against the ordinance was general in all parts of the city, and a much larger vote was cast on the ordinance than was registered for the regular party tickets. The total vote cast for the two party tickets was 23,267, which shows that 10,983 voters went to the various voting places and cast their ballot on the referendum and failed to express their opinion on either of the party tickets. The defeat of the 35-cent gas rate means that the gas consumers of Cincinnati will now pay the rate that will be decided for them by the state public utilities commission. Following the defeat of the ordinance, mayor Puchta gave out this statement: "This ordinance was drawn after due and deliberate investigation of all facts and information pertinent to matters of this character. In this connection, permit me to again say that expert advice was sought and received, public hearings had and rates prevailing in other cities obtained, all of which were carefully weighed in the balance When the ordinance was finally passed it was considered by us that a good contract had been secured. The people thought otherwise, as indicated by the result of the referendum. We must defer our judgment to that of the people It appears that only a continuance of the old rate of thirty cents, and no minimum charge, will be acceptable, and every effort should be made by us to do everything possible

to obtain such a rate. All information indicates that a thirty-cent rate, without a minimum charge, will not be acceptable to the gas company and that it will at once appeal to the State Public Utilities Commission to finally determine the same. This is its legal right, over which we have no control. I therefore recommend that council at once pass a new ordinance, fixing a thirty-cent rate, without a minimum charge." Before the election, the bureau of information and research in city hall gave out a statement denying that Cincinnati is the only city in which a 35-cent rate is charged. The fact is, said the bureau, Piqua, Troy, Tippecanoe City and Covington made new contracts in 1913 adopting a thirty-five cent rate. Their previous rate was thirty cents. Each of these towns, it was pointed out, must meet a minimum charge of seventy cents, whereas the Cincinnati minimum charge under the existing ordinance is only thirty-five cents.

Sidney has a forty-cent rate, adopted in 1913, with a minimum charge of seventy cents, according to the bureau.

There are a number of other Ohio places, continued the statement, which have a sliding scale of gas rates. Effective for a period of ten years in Lima, Wapakoneta, St. Marks, Celina, Coldwater, Ft. Recovery and Cridersville the rate adopted in 1915 is 50c for the first 1,000 cubic feet or fraction, 33c for the excess during the months from May to September, inclusive, and 30c for the excess during months from October to April inclusive. The average is 37 2-3c.

The net rate in Toledo has been 35c for the past ten years or more, subject to a minimum charge of 25c.

There is no rate ordinance in existence in this city, and the rate is therefore subject to change at any time.

The East Ohio Gas Company, which served the city of Cleveland under a ten-year ordinance, beginning 1911, in which rates of 31 cents, less 1 cent for cash, apply for six years, and 37 cents, less 2 cents for cash, will prevail for the last two years of the ordinance. The 35-cent net rate is therefore not as yet effective in Cleveland, but will automatically become so.

There are a large number of cities in Ohio served by the East Ohio Gas Company, prominent among them being such large manufacturing places as Youngstown, Akron, Canton, Massillon, Warren and Niles. The rate ordinances covering these cities are substantially alike, being for ten years, beginning about 1910. The rates in the ordinances for the first five years are fixed at 33 cents, less 3 cents cash discount, and for the second five-year period 38 cents, less 3 cents cash discount.

Generally, there is a minimum charge of 2,000 feet monthly consumption, which involves a minimum charge of not less than 60 cents net per month, increasing to 70 cents net during the second five-year period. The increase in these rates would be effective at present, but the East Ohio Gas Company has not as yet enforced its contracts, because of the discovery and production of large quantities of natural gas in Cleveland and its environs. Because of these productions of large quantities of gas right in the neighborhood being served, the East Ohio Gas company has withheld the increase in price, but, as officially announced, said increase would become effective as soon as the local production is materially diminished.

President Freeman, of the Union Gas and Electric Company, promised a number of improvements. He said: "It is believed Cincinnati will possess an advantage not as yet enjoyed by any other large city in regard to its natural gas supply. In past years the conditions in Cincinnati have been fully as favorable as they have been in Cleveland, Columbus, Toledo, Pittsburg and other cities dependent upon natural gas. Cincinnati is the only one of these cities which will, this year, have an auxiliary supply of artificial gas manufactured within the city, to be mixed with the natural gas. The increased facilities to be provided represent double the established shortage of the coldest days of last winter. Until recently it has been believed that natural and artificial gas could not be mixed with satisfactory results. Gas engineers have been at work on this problem for years, and have only during the past year succeeded in developing a process which will be put into use in Cincinnati. It is fully expected that the process will prove satisfactory. It is not probable that manufacturing establishments can be served with unlimited gas throughout the winter, but the supply will be unlimited for such purpose in all excepting the winter months."

Wholesale Increase Denied Missouri Utilities.

Jefferson City, Mo.—Some time ago the members of the Missouri association of public utilities made a request to the public service commission of the state, asking that they be allowed to increase the cost of water, gas and light by attaching a surcharge to all bills for the period of the war. The public service commission has handed down its decision, refusing the requested increase. The application asked that the increase be allowed because the price of coal, material and labor justified higher rates. They asked the commission to waive an appraisal of their property because they needed more money immediately. The commission holds that each utility corporation must stand alone in its application for increased rates and must be prepared to make the same showing now as they did before the war. The decision affects some three hundred companies.

Profits of Canadian City's Municipal Utilities.

Edmonton, Alta.—City commissioner A. G. Harrison has given out a statement showing the surplus made by the various utilities owned by the city over and above operation and maintenance for the six months ending June 30, 1917. The surplus of the electric light and power plant was $143,141.89, that of the telephone system was $92,165.20, that of the waterworks was $87,732.00, while the municipal street railway made $42,488.04. The total surplus was $365,537.13.

FIRE AND POLICE

Town Wiped Out By Flames.

Sumpter, Ore.—From a blaze originating in a hotel kitchen, the flames swept through the town and destroyed every business house and many of the residences, churches and halls. Only hard fighting at the outskirts saved the surrounding forest. More than 300 people were rendered homeless. The fire fighters saved the depot, the general hospital and the school and a few residences, but all else is gone. The water supply gave out thirty minutes after the fire started and left the workers powerless. As a last resort the fighters dynamited the drug store, one of the principal business blocks of the town, and several other buildings without avail. A Sumpter Valley train tried to reach the city, but had to turn back. A special train from Baker was rushed to Sumpter, carrying two hundred volunteer fire fighters and the equipment of the Baker fire department, but the assistance arrived too late.

Fire Apparatus Antique Balks.

Lebanon, Ill.—A creaky, thirty-year-old hand fire pump that balked cost this town $62,000 worth of property when a business block burned, threatening for a time the commercial section of the town. Four stores were destroyed. When the alarm was given Lebanon No. 1, the antique fire cart, was hurried to the scene. It refused to work, and the fire burned uninterruptedly a half hour until a hand fire engine from Summerfield could replace the Lebanon relic. The flames had gone too far to be stopped by small machines, and calls to neighboring towns were answered by the chemical engines from Willard and O'Fallon. The only near source of water in the city was in public cisterns on the corner, which were soon pumped dry. Lebanon has no city water works. Lack of fire fighting equipment causes Lebanon to pay high insurance rates. A proposition to put in a water system in the city was recently turned down. The city has but the one antiquated hand engine, which is worn out and useless, citizens say.

Police Indicted for East St. Louis Riots.

East St. Louis, Ill.—Police officers and a prominent politician were among the men arrested on charges varying from rioting to murder in connection with the race riots here in July, in which more than one hundred white persons and negroes were killed. Of 105 persons indicted by the grand jury 39 were taken into custody, 30 of whom are white men. The indictments were returned against 82 white men and 23 negroes. Five policemen on duty at the time of the strike were arrested. Thomas Benton, for many years a leader in county politics, also was arrested on a charge of assault to kill. He is the owner of two saloons and has been a candidate for sheriff. The St. Clair County grand jury, in its report, says that after hearing all the evidence it believes the riots were deliberately plotted and there is room for a grave suspicion that a "shrewd, criminal, invisible hand" directed all the moves of the plotters for weeks prior to July 2, when the rioting reached its climax in wholesale slaughter and arson. This, the report says, would have been impossible but for the supine tolerance of "indolent public officials" who heard the rum-

blings, but remained inactive because they were "overawed by cowardly inclinations." The jury expresses its opinion that the hand of a strong and fearless public official could have restrained these atrocities. The immigration of eight thousand or more negroes from the South and their employment in the places of white workmen in East St. Louis industrial plants is held to have been the basic cause of race intolerance which led to the rioting. It is asserted in the report that "engendered with false fears, negroes wantonly murdered policemen bent on aiding them," and that "a rival flame of passion" caused white men to murder negroes. The report asserts that a new form of aversion to the negro was caused by the changed industrial conditions and it tells of the mass meeting of May 28, when a delegation of more than five hundred white men called on mayor Mollman and demanded that the influx of negroes be stopped. "The denunciations were bitter and inflammatory," the report asserts, "and one of the speeches, in particular, advocated mob violence. The threats pronounced in the presence of the mayor ought to have placed the officials on their guard, but when the crowd left the city hall and walked up the streets of East St. Louis a number of negroes were attacked and the riot of May 28, 1917, broke out—all within half an hour after the speakers had finished." After this meeting and throughout June, according to the report, agitators worked among the people and tried to stir up bad feeling. This agitation went on among the whites and the negroes until members of each race thought members of the other were plotting to massacre them July 4. As that date approached there was increased unrest and apprehension. Policemen Coppedge and Wadley were killed by negroes July 2. The policemen had told the negroes they were there to protct them, as well as white citizens. White men in two automobiles drove through the streets and fired shots into the windows of negroes' homes. The grand jury describes the rioting later as "one of the wildest scenes of human carnage and destruction of property recorded in Illinois history." It asserts nearly 100 persons were killed and 245 buildings were burned, while, "with a few exceptions, the police stood by and made no effort to curb the fury of the mob." Meanwhile East St. Louis is not only practically bankrupt, but it faces damage suits aggregating millions of dollars as a result of the breakdown of law and order. When it was found that the city was helpless and could see no way in which efficient guardians of the law could be obtained the business men came to the front, conditioned on one stipulation—that order be restored and the officials of St. Clair county make good. Prominent men announced to attorney general Brundage that they have pledged themselves to raise a fund of $100,000 out of their own pockets with which to establish a real police department in the city.

Spontaneous Combustion Causes Big Pier Fire.

New York, N. Y.—After an investigation of the fire which recently destroyed pier 26, Brooklyn, and damaged two steamers, fire marshal Thomas Brophy reported that the blaze had its origin in burlap bags and that spontaneous combustion was the cause. Several explosions after the fire started gave many persons the idea that incendiary bombs might have been placed on the vessels or on the pier. The fire marshal asserts that these explosions were due to the discharge of signal rockets on board one of the steamers. The total damage caused by the fire is estimated at about $500,000. The destroyed pier was 748 feet long and 85 feet wide. It was of the old-fashioned type with a wooden shed and was piled with grain, sugar, hides, beans, and other merchandise. When the firemen arrived four alarms were turned in. All the fireboats from the river front and twenty tugboats of the auxiliary service aided in fighting the blaze. In less than half an hour the pier was a roaring mass of flames. Many of the smaller boats were towed out into the stream. Before one of the steamers could be moved her superstructure caught fire and the hawsers holding her to the pier were burned through. She was then towed into the river, where the fireboats poured water into her until the blaze was extinguished.

GOVERNMENT AND FINANCE

Joplin Mayor Recalled.

Joplin, Mo.—Mayor Hugh McIndoe has been recalled by a vote of 2,273 to 957 at a special recall election held after the presentation of a properly signed petition presented to council. The charges against the mayor deal with law enforcement, and it is said that his recall has been due to strict enforcement and antagonism aroused by the arrest of a locally prominent member of a powerful fraternity. Charles A. Robinson is now mayor and there has been a thorough shake-up in the police department.

Big Business Man for Steel City Mayor.

Bethlehem, Pa.—Following an insistent and widespread demand from thousands of citizens, Archibald Johnston, vice-president of the Bethlehem Steel Company, has consented to become a candidate for the position of first mayor of the newly consolidated city. He has given out a statement that if he is elected he will organize his administration into departments of public affairs, of accounts and finances, of streets, of parks and public property, and of city planning. He states that he will appoint a city manager.

Vote Against Increased Tax Rate.

Champaign, Ill.—The proposition to raise the city taxes from 1.2 per cent to 2 per cent has been defeated at a special election by a majority of 273. There were 314 men voted for the question and 518 against, and 142 women voted for and 211 against. The total vote for the proposition was 456 and 729 against. The city officials claim that the lower tax rate will result in handicaps to their administration and the postponement of improvements.

To Draft Utility Legislation "In the Open."

New York, N. Y.—The Public Service Commission for the First District has announced a plan for "drafting legislation in the open." The law under which it was created explicitly authorizes the commission to recommend legislation which it deems wise or necessary in the public interest as to corporations and matters within its jurisdiction and provides that the commission may hold hearings and take testimony in respect to any matter of legislation. This method the commission proposes to apply to the formulation of future legislation amending the public service commission's law; the railroad law, the transportation corporation's law and other statutes affecting public service corporations and their rates and service. Corporations will be invited to submit their legislative proposals in advance for scrutiny. Individuals interested in the perfecting of legislation will also be invited to follow the same course. Every company under the jurisdiction of the commission has been invited to participate in hearings to which various individuals and public organizations, including the bar association, the central federated labor union and other organizations have also been invited to participate.

STREET CLEANING AND REFUSE DISPOSAL

Municipal Piggery Profitable.

Lansing, Mich.—After nine months of operation of the municipal piggery the city now has 190 pigs in its pens and its debt upon the establishment has been reduced from $2,000 to $1,300. The stock is valued at over $4,000. Mayor J. Gottleib Reutter, through whose efforts and past experience in handling stock, the municipal piggery was established, is very enthusiastic over the project after the nine months of experiment. The pigs being raised by the city are not of the thoroughbred type. They are bought up from time to time by the mayor from farmers and small stock raisers about the city. An effort is made to secure pigs which weigh between 50 and 100 pounds. With hogs selling for 14 cents a pound the city's profit upon one pig for the average period in which it is retained at the piggery would be $12.60. Mayor Reutter considers that the municipal piggery is proving to be all profit, since the city

is relieved of the expense which would be incurred through the establishment of an incinerator. The Lansing piggery was given its start Nov 6, 1916, when mayor Reutter, former city clerk McClellan and aldermen Decke, Rubson, Young and Reck acted as security for the borrowing of $2,000 for the purchasing of 132 pigs and the erection of buildings and fences on the city farm. On the city farm of 16 acres, three acres have been fenced off for pigs. Sheds were put up for the housing of the stock. Additional sheds and pens were erected for the housing of those hogs which might need special attention. To facilitate the work during the winter the city administration took one of its worn asphalt paving engines to the piggery. During the winter the engine is used for the heating of the main building, the heating of water for the cleaning of the garbage cans, and for the thawing out of the garbage. That the pigs might have fresh water throughout the warm months the engine is used to pump water from the river, on whose bank the piggery is located, to a hog wallow. Prior to the establishment of the piggery the disposing of the city garbage by burial was costing the city approximately $100 more a month. When the Cleveland Reduction Company, which held the contract for the hauling of the city's garbage, was dissolved the city officials took over the company's garbage cans for $511. The company had been conducting the garbage collection at a cost of 10 cents a week to households and $1 a week to restaurants and hotels. The city continued the garbage collection on the same cost basis. The company had been hauling its garbage cans by teams, but the city secured two large motor trucks and one small motor truck in addition to one team. Where the teams had been able to carry 100 cans a day the trucks are now able to carry 200 cans a day. The method of charging for the collection is to be changed according to a new ordinance. A service charge of $1 a year is made to all users. No provision is made in regard to making an additional cost to the restaurants and hotels.

Company Must Pay City for Garbage.

New York, N. Y.—Supreme court justice Lehman has handed his decision in a suit brought by the city against the New York Disposal Corporation and others to recover about $400,000 due under a contract made in 1913 by which the defendant agreed to buy the city's garbage for five years at $62,500 the first year, $87,500 the second, and $112,500 for the last three years. The defendant paid nothing after October, 1914, on the ground that the city had represented that 340,000 tons of garbage was disposed of in 1912, whereas the amount was only 270,000 tons, and that the city also permitted others to take some of the garbage that should have been delivered to the defendant. A counterclaim for $986,000 against the city because of shortage in the amount of garbage to which the defendant was entitled was made. Justice Lehman ruled that the city had made no representations and that it was not responsible for the failure of the defendant to get all the garbage collected. He decided that the defendant must pay the full amount sued for.

New Contract for Garbage Collection.

Pocatello, Ida.—According to announcement by Dr. C. T. Smith, health officer, the city of Pocatello has entered into a contract with K. F. MacDonald for the disposal of garbage, meaning all kitchen, fruit and table refuse not unfit for food for hogs. The city itself will undertake the disposal of ashes, cans and other refuse. The following regulations, covered by city ordinances, are to be observed in order to systematize the collection of waste, according to directions to householders:

1.—Provide yourself with a metal garbage can of at least 10 gallons capacity, having a tight cover with a bail or handle and with a flange of from ½ to 1 inch to hold cover on the can; also with a flange of from ½ to 1 inch on the bottom of the can to protect it from contact with the ground.
2. See that the cover is on the can at all times excepting when you are putting in or taking out garbage.
3. Put absolutely nothing in the can that is in any way injurious to hogs, namely, liquids, glass bottles, broken dishes, rags, metals, wood, chemicals, etc.
4. Put your can on the alley line if the alley is accessible; if not, put it in such place that it can be easily removed by the garbage collector.
5. Scald out your can at least once a week during the summer months.
6. Put your clean ashes in a box or barrel or pile them in a compact pile on the alley line.
7. Do not put cans, broken glass, bottles, metals, rags, etc., in with your ashes, but put them in a separate receptacle and cover it over to exclude flies; place near the ash pile on the alley line.

Garbage is being collected at least once a week from the residence district and once daily from the business district. The city has pledged itself in its contract to prosecute all violators of the regulations. Waste, other than garbage, will be collected at regular intervals by the city teams. Citizens are warned not to burn or otherwise destroy any kitchen, table or other refuse suitable for feeding swine.

Rules for Garbage Collection.

Flint, Mich.—The board of health recently issued the following rules regarding garbage collection. All garbage must be collected by the United Disposal & Recovery company, provided the same is placed in a metal can holding not more than 15 gallons, properly covered with a tight fitting lid. The can must be placed in an easily accessible place where it can be readily seen by the collector. All tin cans and unbroken bottles must also be collected by the United Disposal & Recovery company, provided they are placed in a separate metal can, properly covered similar to the ordinance garbage can. The city reorganized its garbage collection system a few months ago and the service is now very satisfactory. The rules for collection provide for the use of a water-tight receptacle of a good type that will hold garbage for three days in the summer and one week in the winter be provided by each householder. No particular type of can is specified. The householder also is required to provide a suitable receptacle for the keeping of tin cans and unbroken bottles. A license is required for the collection of garbage. Any violation of the ordinance is punishable by fine of $100 or 90 days in jail, or both.

TRAFFIC AND TRANSPORTATION

Car Strikes End.

Kansas City, Mo.—After complete suspension of service lasting eight days, the street car strike here has been settled. The settlement was achieved by a committee of business men which drew up an agreement which was signed by the company and the employees. All men are to return and resume their former places. Committees of employees will be received by the company officials and arbitration of disputes is provided for. There is to be no discrimination against union men, but there is to be an "open shop" policy—while the company's proposal for individual contracts was refused. After four days' strike several hundred strikebreakers were brought in, but the cars were attacked by mobs and one was burned—the strikebreakers were removed. A restraining order against strikers, city officials and any others preventing interference with car operation was granted by both the Kansas and Missouri courts. These temporary injunctions were obtained to keep the company from being thrown into the hands of a receiver by court order, according to a demand by the city officials. The city council attempted to stop strike-breaking by passing an ordinance licensing all conductors and motormen and requiring twenty days' experience at work in the city, under penalty of $100 to $500 fines.

Butte, Mont.—A thorough tie-up of all street car traffic, which lasted six days, was finally broken when striking employees and the electric railway company agreed. The men wanted increased wages without conditions, while the company insisted on giving increases based on the fluctuations in the copper market. The company offered 45 cents an hour for first-year men, 50 cents for second to fifth-year men and 53⅛ cents for all men with more than five years of service—with time and a half for overtime after twelve hours, based on the price of copper at 20 cents a pound and over. An amount of 2½ cents an hour would be de-

ducted when copper was below 20 cents; 5 cents when copper was below 18 cents, and an amount sufficient to bring back the old scale when copper was below 15 cents. The union demanded the elimination of the five-year clause, with 53⅛ cents an hour for the first year and 56¼ cents an hour for the second year and after, irrespective of the price of copper, with time and a half for work over ten hours. The strike was settled at a conference on Aug. 8 between officials and employees and mayor W. H. Maloney. The conference agreed on a scale of wages of 47½ cents, 50 cents and 53⅛ cents an hour for men whose employment extended over a period of one, two and more years. The agreement also provides for time and a half for all work over eleven hours. This is a flat scale of wages, fixed independently of the fluctuations of the copper market, in accordance with the men's demands.

Lima, O.—A settlement has finally been reached by the striking employees and the Ohio Electric Railway. The strike lasted over a month. The settlement, it is said, was hastened by the determination of the authorities to prevent a recurrence of the disorder that accompanied the attempt to resume service. The agreement provides for changes in wages and working conditions, but not for union recognition. Eight men are now in jail on charges in connection with the riot. After this governor Cox notified the company that no cars should be operated in Lima until further notice. This became necessary because of the state's inability to give the local officials aid from the national guard. Both sides made concessions, but the company refused to recognize the union. As far as possible it was agreed to abolish split runs, and cars will be operated in such a manner as to give the men nine and one-half hours' work for ten hours' pay. The wage scale provides 25 cents an hour for the first year, and an increase of 1 cent an hour for each additional year's experience up to five years. After this the men are to receive 30 cents.

Grade Crossing Gates Must Be Down at Night.

New York, N. Y.—The Public Service Commission for the First District has issued an order directing the New York Central Railroad, the Long Island Railroad and the Staten Island Rapid Transit Railway to keep the gates at 143 grade crossings lowered from midnight until 5 a. m. in order to protect vehicle traffic. Two others are to be kept closed between 2 and 5 a. m. Following hearings this measure was recommended by Commissioner Hervey. Before hearing an investigation had been made by the commission and data collected on the use made by vehicles and pedestrians of the principal crossings between the hours in question. The police department indorsed the plan, and at the request of the commission made an additional investigation of all the 145 crossings, after which it recommended the list of crossings which should come under the commission's order. The order is now in effect, and will remain so for one year unless abrogated in the meantime by the commission. All of the railroads involved are said to be in favor of the plan. In his opinion, commissioner Hervey said that the crossing gates were not a sufficient safeguard to the public on account of negligent watchmen. The inspections disclosed that watchmen were frequently asleep during the early morning hours. Time clocks, to be punched at half-hour intervals, were tried out at certain crossings, but some gatemen found means of evading the scheme. Even thorough inspection by roundsmen had not proved altogether successful. The installation of signal semaphores to give a stop indication when the gates were up had also been considered.

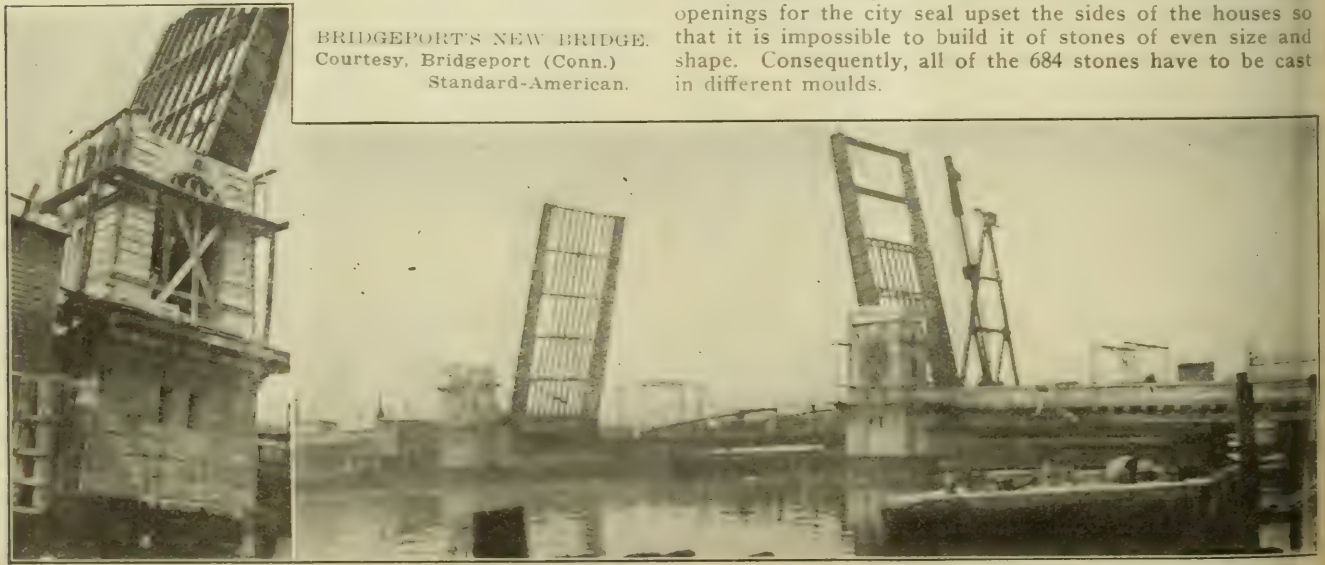
MISCELLANEOUS

A Woman City Engineer.

Williston, N. D.—Miss Esther Jack has been appointed city engineer and it is probably the first time in North Dakota or in the northwest that a woman has been appointed to such an office. She succeeds captain E. R. Evans, who has been called into federal service. Miss Jack is a graduate of the engineering department of the state university, being the first woman graduated from that department. She is the daughter of a well-known farmer living a short distance from Buford.

Bridge Nears Completion.

Bridgeport, Conn.—After nearly a year's work, half of the new Stratford avenue bridge is nearly completed and opened for use. Both of the big roller lifts are now in operation. Half of the bridge above the old bridge was in service while the old bridge was being demolished and until the other half is completed. The work on the other half of the bridge will be started later and probably will not be opened until a year from now. The half nearly finished is almost as large as the whole of the old bridge, however, so the public will be but slightly inconvenienced while waiting for the completed structure. The large roller lifts allow a channel more than twice as large as the old one, and which open very rapidly, causing little delay. At the present time, however, while the old bridge is in use, the old draw has to be opened after the new roller lifts are raised, so that tie-ups of traffic are frequent while boats are being let through. The bridge is built of steel and reinforced concrete, the concrete being "cast stone," made by the Concrete Building and Construction company. The stone resembles granite so closely that it is almost impossible to tell the difference. Instead of building the bridge of one solid piece of concrete, each stone is cast and placed in position, 684 stones being used. The bridge will have four little houses, one on each corner, when it is completed. Two of these houses will be comfort stations, one for men and the other for women, and the other two will be operating houses. Two of these houses are now in position. Each has a different angle or is different in size. Windows and openings for the city seal upset the sides of the houses so that it is impossible to build it of stones of even size and shape. Consequently, all of the 684 stones have to be cast in different moulds.



BRIDGEPORT'S NEW BRIDGE.
Courtesy, Bridgeport (Conn.) Standard-American.

NEWS OF THE SOCIETIES

Calendar of Meetings.

Aug. 27-29. UNION OF CANADIAN MUNICIPALITIES. Annual convention, London, Ont. Secretary, W. D. Lighthall, K. C., Westmount, Que.

Aug. 28-30.—PENNSYLVANIA LEAGUE OF THIRD CLASS CITIES. Annual convention, Harrisburg, Pa.

Aug. 29-31.—UNION OF NOVA SCOTIA MUNICIPALITIES. Annual convention, Truro, N. S. Secretary, Arthur Roberts, Bridgewater, N. S.

Aug. 29-31.—ONTARIO MUNICIPAL ASSOCIATION. Annual convention, Toronto, Ont. Secretary, E. H. Spence, 705 Lumsden building, Toronto, Ont.

Sept. 10-12.—AMERICAN CHEMICAL SOCIETY. Fifty-fifth annual convention, Boston, Mass.

Sept. 10-15.—NATIONAL EXPOSITION OF SAFETY AND SANITATION. Annual conference, New York, N. Y. Secretary, C. C. Cameron, Continental and Commercial Bank building, Chicago, Ill.

Sept. 11-13.—AMERICAN ASSOCIATION OF PARK SUPERINTENDENTS. Annual convention, St. Louis, Mo. Secretary, Roland W. Cotterill, 533 City Hall, Seattle, Wash.

Sept. 11-14.—INTERNATIONAL ASSOCIATION OF MUNICIPAL ELECTRICIANS. Annual convention, Niagara Falls, N. Y. Secretary, Clarence R. George, Houston, Tex.

Sept. 11-14.—NEW ENGLAND WATER-WORKS ASSOCIATION. Annual convention, Hartford, Conn. Secretary, Willard Kent, 715 Tremont Temple, Boston, Mass.

Sept. 18-20.—LEAGUE OF IOWA MUNICIPALITIES. Annual convention, Iowa City. Secretary, Frank G. Pierce, Marshalltown, Ia.

Sept. 18-20.—LEAGUE OF VIRGINIA MUNICIPALITIES. Annual convention, Lynchburg, Va. Secretary, L. C. Brinton, Portsmouth, Va.

Sept. 24-29.—LEAGUE OF CALIFORNIA MUNICIPALITIES. Annual convention, Santa Rosa, Cal. Secretary, Wm. J. Locke, Pacific Building, San Francisco, Cal.

Sept. 24-29.—THIRD NATIONAL EXPOSITION OF CHEMICAL INDUSTRIES. Exposition, Grand Central Palace, New York City.

Sept. 25-27.—SMOKE PREVENTION ASSOCIATION. Annual convention, Columbus, O. Secretary, Frank A. Chambers, City Hall, Chicago, Ill.

Sept. 27-29.—AMERICAN AND CANADIAN ENGINEERS AND ARCHITECTS OF NORWEGIAN BIRTH OR DESCENT. Informal congress and re-union, Chicago Norske Klub, Chicago, Ill. Chairman, Committee on Arrangements, Joakim G. Giaver, consulting engineer, Chicago, Ill.

Oct. 9-12.—LEAGUE OF KANSAS MUNICIPALITIES. Annual convention, Wichita, Kan. Secretary, C. H. Talbot, University of Kansas, Lawrence, Kan.

Oct. 15-17.—NATIONAL HOUSING ASSOCIATION. Annual conference, Hotel La Salle, Chicago, Ill. Secretary, Lawrence Veiller, 105 East 22d St., New York City.

Oct. 17-18.—LEAGUE OF MINNESOTA MUNICIPALITIES. Fifth annual convention, St. Cloud, Minn. Secretary-treasurer, Richard R. Price, University of Minnesota, Minneapolis.

Oct. 22-24.—AMERICAN CIVIC ASSOCIATION. Annual meeting, St. Louis, Mo. Secretary, Richard B. Watrous, 914 Union Trust building, Washington, D. C.

Oct. 28-30.—TEXAS CONFERENCE ON SOCIAL WELFARE. Annual convention, Houston, Texas.

Nov. 19-24.—CITY MANAGERS' ASSOCIATION. Annual meeting, Detroit, Mich. Secretary, W. L. Miller, City Manager, St. Augustine, Fla.

Nov. 20-23.—PLAYGROUND AND RECREATION ASSOCIATION OF AMERICA. Recreation Congress, Milwaukee, Wis. Secretary, H. S. Braucher, 1 Madison Ave., New York, N. Y.

Nov. 21-24.—NATIONAL MUNICIPAL LEAGUE. Twenty-third annual meeting, Hotel Statler, Detroit, Mich. Secretary, Clinton Rogers Woodruff, 703 North American Bldg., Philadelphia, Pa.

Chicago Cement Machinery and Building Equipment Show.

The announcement by the Cement Products Exhibition Co. that there would be no cement show in 1918, and the latter announcement by the National Exhibition Co. of the coming Cement Machinery and Building Equipment Show, to supersede the annual cement shows, have caused several of last year's exhibitors to ask about the management and scope of the coming exhibition.

Prior to either announcement, investigations were conducted, with the cooperation of the trade papers, first to ascertain the attitude of tenth show exhibitors toward another cement show, and second, to ascertain from manufacturers in other building lines, their attitude toward representation with exhibits at the shows. When it was found that a big majority of cement show exhibitors favored another exhibition and that producers of other building materials were anxious to exhibit a new and independent company was organized, not to conduct a mere cement show, but to conduct a contractors' and builders' show.

Cement shows, clay product shows, good road shows, etc., have been held in the past with varying success. Frequently it happened that manufacturers exhibited at two shows at the same time. It is the hope of the management, by means of the coming show, to convert several small or partial successes into one huge success.

Under the new plan, Chicago becomes the logical meeting place for many conventions. Negotiations are now pending to bring to Chicago meetings of the American Society of Engineering Contractors, the American Water Works Association, the National Sand & Gravel Users' Association, the American Highway Association, the American Road Congress, the National Paving Brick Manufacturers' Association, etc.

Iowa Association of Chiefs of Police and Special Agents.

The annual convention of this association was held August 14 and 15 at Marshalltown, Ia. Attendance at the opening meeting was much less than was expected. There were only about twenty present when the business session opened. Tuesday afternoon the officers listened to addresses by United States Marshal E. R. Moore, of Dubuque, and Deputy United States Marshal Michael Healy, of Cedar Rapids, and County Attorney Ray P. Scott. County Attorney Scott led discussion of the "bone dry" and the Webb-Kenyon laws.

Practically all of the forenoon session today was devoted to an informal discussion of the efforts of the association and its friends in the general assembly to get through a measure to put chiefs of police under civil service. Such a bill was defeated in the general assembly last winter. The chiefs of police are agreed that their office should be under the civil service, the same as is the office of chiefs of fire departments.

United States Marshal E. R. Moore of Dubuque, gave the principal address of Tuesday afternoon, during which he heartily thanked the members of the association for their cooperation throughout the northern district, in preparing for the recent registration, declaring that the successful outcome of the undertaking was largely the result of their united efforts in the matter.

Fort Dodge was selected as the place for the 1918 meeting and officers elected as follows: Chief of police M. J. Jordan, of Fort Dodge, re-elected president, and Chief Charles F. Breckel, of Marshalltown, was again chosen as vice-president. Martin Burke, of Dubuque, special agent of the Illinois Central railroad, was elected secretary and treasurer.

National Exposition of Chemical Industries.

During the week of Sept. 24th there will be held in the Grand Central Palace, New York, the Third National Exposition of Chemical Industries, that will portray the progress our chemists have been making toward preparing the nation for its great war and for the place it must occupy in the world's commerce after the coming of peace.

One of the managers of the Exposition, Charles F. Roth, a member of

(Continued on page 212)

PERSONALS

Hendricks, Calvin W., chief engineer of Baltimore, Md., has resigned to take effect October 1. Engineer Hendricks was the builder of Baltimore's $23,000,000 sewerage system.

Leavitt, H. Walter, has been appointed testing engineer for the Maine State Highway Commission, succeeding E. D. Kingman. Mr. Leavitt was recently employed by the office of public roads and rural engineering at Washington, D. C., as student assistant testing engineer. The testing laboratories of which he now has charge are located at the University of Maine, Orono, Maine.

Mullican, N. S., city manager of the city of Thomasville, has resigned the position as city manager to accept the place of chief highway engineer of Davidson county, North Carolina. Mr. Mullican has been retained by the city of Thomasville as consulting engineer.

Quail, Joseph N., has been appointed by Mayor Mitchel, of New York, as supervisor of the City Record, succeeding David Ferguson, who has resigned on account of ill health.

NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

STEAMOTOR TRUCK.

A New Type of Commercial Vehicle Run by Steam.

The Steamotor truck utilizes the Doble steam power plant for automobiles, which has stirred such wide interest in its use in pleasure cars. Extreme simplicity, record economies and ease of operation are claimed for the machine. The power plant of the Steamotor truck has only 24 moving parts, of which fifteen are in the engine. There is no clutch, no gear set and no complicated driving mechanism. A short drive shaft connects the engine to the rear axle and practically all the power developed is delivered at the wheels. The truck is claimed to go up any hill upon which its wheels can find traction and because of evenness of torque and availability of all the power at low speeds it can go through sand or rough places.

The truck uses only kerosene for fuel—no gasoline is necessary even for starting purposes. The burner is lighted by an electric spark and there is no troublesome pilot light or similar mechanism.

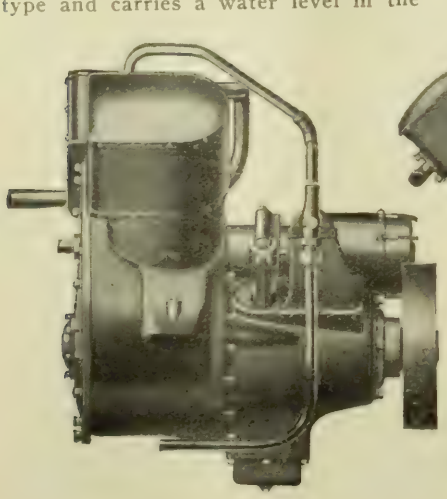
The turning of a switch on the steering post ignites the fuel and the truck is ready for duty. It is claimed that from a perfectly cold start steam is developed in less than a minute and after an over-night stand in ten or fifteen seconds.

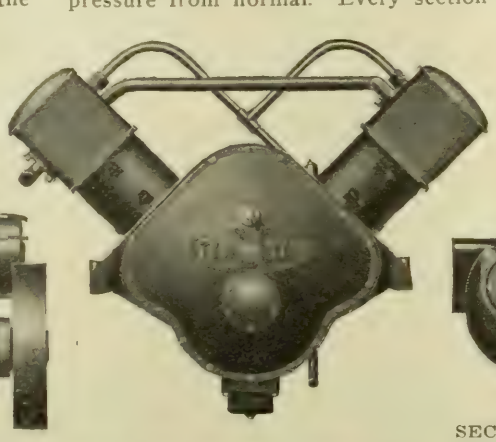
The Doble combustion system and steam generator are simple and efficient. With the Doble system of condensing the exhaust steam and reusing it, it is held to be possible to run from 800 to 1,000 miles on one supply of water. The power plant consists essentially of the steam and water system, the fuel and combustion system and the engine or power transmission system. The design of the generator is based on the water-tube type and carries a water level in the evaporating zone. It consists of 28 identical sections placed in an insulated casing. Each section consists of two horizontal headers connected by sixteen vertical tubes. They are made entirely of cold drawn seamless steel tubing of about one-half inch diameter. The vertical tubes are swayed and welded to the headers by the autogenous acetylene process, making the joints really stronger than the tubing itself. The combustion chamber is directly beneath the steam generating sections, while the exhaust for burned gases is below the economizer sections. The intake water manifold delivers water simultaneously to the economizer sections through their lower headers, the water being forced in by a crank-driven plunger pump. When the economizer sections are completely filled, the water overflows from the upper headers into a manifold, which delivers it simultaneously to the lower headers of the evaporating sections. Here the water level is maintained about half way up the generator by means of a by-pass valve and a regulator tube so arranged that it expands when full of steam, so that more water enters, and contracts when there is sufficient water. The hot gases rise from the combustion chamber, giving up their heat to the closely grouped vertical tubes, pass over the bridge wall, and a large number of their remaining heat units are absorbed by the relatively cool water flowing through the economizer sections. The generator is thus designed to possess the most distinctive advantages of both fire-tube and flash boilers.

The normal steam pressure in the generator, while power is being used, is 600 pounds. Pressure is maintained at the throttle by an automatic device which cuts off or renews the fuel supply according to the variation of the pressure from normal. Every section of the generator is tested to withstand an hydraulic pressure of 5,000 pounds and the actual bursting point is over 8,000 pounds. There is also attached to the generator tubing a safety valve which operates if the steam pressure reaches 1,000 pounds. The generator produces 45 horsepower and has 150 square feet of heating surface.

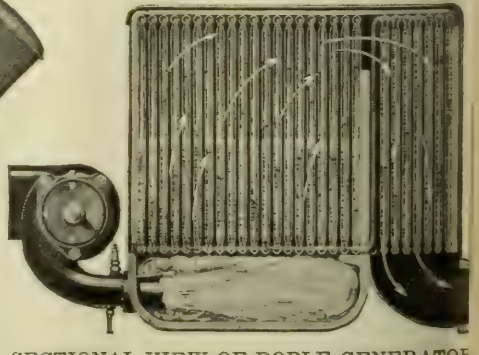
The live steam is led from the upper headers of the generator into the manifold, passes through the throttle valve and down the steam chest of the engine. The engine is two-cylinder, single-expansion, double-action. The counterflow principle is employed in order to insure that maximum torque be obtained at any position of the crankshaft. The slide valves, one for each cylinder, take care of both the inlet and exhaust. The valves are actuated by a specially designed link valve-gear, which allows a cut-off of 80 per cent of the stroke for starting. The cut-off in normal operation is 20 per cent. This valve gear also reverses the engine without additional devices. The engine is of the V-type, the cylinders being set at an angle of 90 degrees, one crank serving for both. The cylinders are 4-inch bore by 4-inch stroke, which with the standard gear ratio produces enough torque to slip the driving wheels with the truck fully loaded. The crank case is an aluminum alloy casting, and contains all of the moving parts of the engine except the piston and valves. The ball bearing eccentrics for the valve gear are on the return crank just ahead of the main crank. The eccentric which drives the boiler feed pump and the lubricating pump, together with the governor, are situated between the main bearings. The crankshaft and the main bearings are annular roller.

The lubricating system is a splash and force feed combined—eccentric connecting rods and governor by the former and cross-heads and wrist pin by the latter. The oil remains cool





SIDE AND FRONT VIEWS OF STEAMOTOR ENGINE.



SECTIONAL VIEW OF DOBLE GENERATOR (Large arrows indicate flow of gases of combustion; small black arrows show flow of water.)

d clean and should last several sea-ns.

Kerosene is used both for starting d running. Air, drawn through the diator by a small electrically driven ultivane blower, passes the spray zzle with a sufficient velocity to aw out the kerosene and atomize it. his velocity immediately decreases, e to the widening of the venturi e and the full mixture is ignited by electric spark. As soon as the ner is lighted the spark ceases auto-atically. The combustion takes place a chamber made of special refrac-ry material, which attains a very h temperature and insures complete mbustion by heating the gases be-e they burn.

The exhaust steam from the cylin-rs is carried to the top of the radi-r and is forced down through it the pressure of the following steam. honeycomb type radiator is used. e water of condensation enters the ter tank very near the bottom. Any am that enters is therefore con-nsed by going up through the ter—and in addition there is a steam nt at the top of the tank.

The lubrication of the throttle and linder valves, the cylinder walls, the erior of the generator, and the water mps, is accomplished by the addi-n of a small quantity of standard linder oil to the water. The oil is mped into the cylinder along with e water and there performs several nctions. It coats every portion of e generator interior with a film of l, which is very thin at the 485 de-ees F. temperature maintained. The l protects the surface from scale and sting also and prevents particles of l from adhering and finally clogging me passage. The throttle valve, lves and pistons of the engine are bricated by oil carried along with am bubbles.

The engine is fastened to the frame three points. The power is trans-tted to the rear axle by a propeller aft. Two universal joints of very gged construction are employed, and equate lubrication is insured by a t from the pressure feed of the gine.

Axles are Timken—front is I-beam tion, 2x2¾, solid center—rear axle, rm driven—drive axle full floating, 1¾-inch diameter. Brakes are hand brake and foot brake internal duplex on 17 inch brake drum on rear wheel

Chassis is 212⅛ inches long, overall; length of frame back of driver's seat is 116½ inches, wheel base, 114 inches. The frame is pressed steel channel, ¼ inch thick, 5 11/16 inches deep, 2½ inches at top and bottom. The springs are semi-elliptic. The tires are pressed on or demountable. Wheels are artillery type, 2x1¾-inch, rectangular in front, 2½x2¼-inch rectangular spokes in rear. The total admissible load on chassis, including body is 5,500 pounds. The rated capacity of truck is 4,000 pounds.

The accompanying illustrations show the chassis and various views of the engine and generator. The truck is made by the Steamotor Truck Co., 110 South Dearborn street, Chicago, Ill.

MANHOLE COVER.

Designed to Withstand Heavy Traffic.

The need of a manhole cover which traffic cannot "dish" or jog out of place is recognized every working day by street superintendents and public works officials. To supply this need a specially designed cover has

DEE MANHOLE COVER.

been developed which is claimed to withstand the stress of the heaviest traffic.

It is constructed with dovetailing lugs which are calculated to insure adequate protection against any pressure exerted on the cover. Another advantage claimed is that the cover does not rattle, but settles firmly in place. The cover is also claimed to be frost-proof and easily opened during freezing weather.

The cover is shown in the accompanying illustration. Among other municipalities, the village of Oak Park Ill., and the city of Chicago's electrical department, as well as the South Park commission, have adopted this type of cover. It is made by the Wm. [illegible] company, 30 North La Salle street, Chicago, Ill.

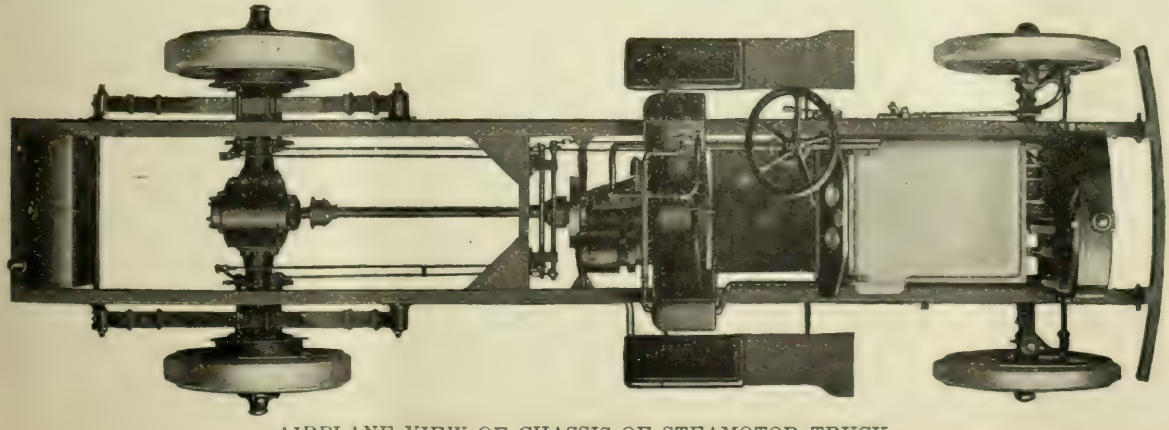
INDUSTRIAL NEWS

Cast Iron Pipe.—Prices continue very high. There has been little new business except a few orders from the west and more government work. Minneapolis, Minn., is expected to enter the market for about 1,300 tons and Wauwatosa, a suburb of Milwaukee, will buy 200 tons. The government has ordered 500 tons of 6-inch for the aviation camp at Grassland, Ill. Quotations: Chicago—4-inch, class B, $68.50; 6-inch and larger, $65.50; class A, $1 extra. New York—4-inch, class B and heavier, $68.50; 6-inch, $65.50. Birmingham—4-inch, class B and heavier, $63; 6-inch, $60; class A, $1 extra.

Trade With Venezuela.—Practically all of Venezuela's imports of construction materials and supplies are now coming from this country, but we are in danger of losing much of the trade as soon as the war is over. Just where the danger lies and what the trouble is is carefully explained by Special Agent W. W. Ewing in a publication, "Markets for Construction Materials and Machinery in Venezuela," Special Agents Series No. 144. Copies may be obtained at 10 cents each at the Bureau of Foreign and Domestic Commerce, Washington.

The Society for Electrical Development, Inc., 29 West 39th street, New York City, is distributing a new bulletin, entitled "Aims and Achievements." This is a brief summary of what the society is accomplishing for its members and for the entire electrical industry. This bulletin describes just what this society is, how it has grown, what its work includes and gives a complete directory of its members, officers and committees.

The George Cutter Company, South Bend, Ind., announces the appointment of R. W. Ten Broeck and A. B. Sonneborn as sales representatives for the



AIRPLANE VIEW OF CHASSIS OF STEAMOTOR TRUCK.

state of Michigan, with offices at 426 Ford building, Detroit. In connection with the sale of street and industrial lighting equipment, switches, panelboards, switchboards, cutout boxes and other products of the George Cutter Company, an engineering department will be maintained for the purpose of drawing up plans and specifications for the installation of such equipment. Mr. Ten Broeck was associated with the Packard Motor Company for a number of years.

NEWS OF THE SOCIETIES

(Continued from page 209)

the American Chemical Society, said that, "never had any nation ever before been brought so forcibly to a realization of how dependent upon chemistry all its industries were as when the United States found itself facing an industrial emaciation, and it brings great credit upon the American chemist for the part he has taken in bringing the country to a state of self efficiency and self containedness. He has accomplished in a couple of years what it has taken our enemy nation forty years to perform, and with the aid of our financiers has built whole towns and given employment to the great army of unemployed who constituted so grevious a problem in the United States three years ago.

"In the past year, and even since the last exposition, in September, 1916, such great strides have been made in the industries, so many new applications of things chemical, and the introduction of chemicals, either directly or indirectly, in modern warfare and materials of war, that the exposition will be one of thrilling inspiration to the person possessing some knowledge of chemistry, and to the lay mind that will easily be able to grasp the vital meaning of the great many exhibits that the few hundred large companies are preparing.

"The purposes of the exposition are not to show the progress made in all the chemical industries but to indicate where progress can be made, and where opportunities await development, and how our national resources and wastes can be made valuable and useful.

"It gives the man of science, the financier, manufacturer, and plant operator the opportunity of personal contact with the latest machinery, materials, and products used and applied in all the chemical industries, and the opportunity of learning how they can be applied to his specific purposes."

This year again the South invites capital and industry to investigate the wonderful opportunities it offers in its undeveloped resources for all manner of industry, in a great section of exhibits known as the Southern Opportunity Section.

On Monday, Sept. 24th, at 2 P. M. opening addresses will be made by Dr. Charles H. Herty, chairman of the advisory committee of the Exposition and editor of the Journal of Industrial and Engineering Chemistry, by Prof. Julius Stieglitz, president of the American Chemical Society, Dr. Colin G. Fink, president of the American Electro-chemical Society, and Dr. G. W. Thompson, president of the American Institute of Chemical Engineers.

Among other speakers on the program for other days are W. S. Kies, vice-president National City Bank, who will speak upon the "Development of Export Trade with South America;" Prof. Marston Taylor Bogert, chairman, chemistry committee, National Research Council, who will speak upon "The Operation and Work of the National Research Council for the National Weal." Dr. L. H Baekland of the Naval Consulting Board will make an address on "The Future of American Chemical Industry."

One day a symposium upon the national resources as opportunities for chemical industries will be given, and among the speakers will be C. H. Crawford, Ass't to president, Nashville, Chattanooga & St. Louis Ry.; V. V. Kelsey, chemist-industrial agent, Carolina, Clinchfield, and Ohio Ry.; Dr. E. A. Schubert, mineralogist-geologist, Norfolk & Western Ry.; Dr. T. P. Maynard, mineralogist-geologist, Central of Georgia Ry. and Atlantic Coast line Ry.; Dr. J. H Watkins, geologist, Southern Railway

The motion picture program will be one of wide interest. The Bureau of Commercial Economics at Washington will supply many toward completing the range of industrial films.

Western Pennsylvania Firemen's Association.

The annual convention of this association was held at Irwin, Pa., Aug. 16 and 17. Meyersdale was selected as the convention city for 1918 and the following officers elected: W. E. Debolt, Connellsville, president; William H. Sharah, Braddock, secretary, and James H. Steele, Wilkinsburg, treasurer.

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

Chenoa, Ill., is making STREET IMPROVEMENTS. The engineers for the work are Melluish & Broyhill, Unity building, Bloomington, Ill.

Beresford, S. Dak., is planning ROAD IMPROVEMENT work by filling and is now receiving bids. The Dakota Engineering Co., Mitchell, S. D., has charge of the work.

Bids are being received by the village of No. St. Paul, Minn., for GRADING and STREET IMPROVEMENT. F. J. Armstrong, 721 Germania Life Bldg., St. Paul, is engineer.

The Highway Commission of District No. 1, Yazoo City, Miss., has laid out a large program of ROAD improvement. The work is under charge of W. H. Bradley, Flora, Miss.

San Angelo, Tex., is about to construct a complete SEWAGE DISPOSAL plant from plans prepared by Henry Exall Elrod, Interurban Bldg., Dallas, Tex.

Leola, S. D., is receiving bids on a reinforced concrete RESERVOIR. The Dakota Engineering Co., Mitchell, S. D., are the engineers for the city.

Bids are being received by Corning, N. Y., for CONDUITS and the improvement of Monkey Run according to plans prepared by Solomon, Norcross & Keis, engineers, Atlanta, Ga., and Watervliet, N. Y.

The city of Oswego, Ore., is receiving proposals for PAVING several streets with concrete. The plans were prepared by D. W. Taylor, 507 Board of Trade Bldg., Portland, Ore.

Sedan and Arcadia, Kans., have had under consideration the construction of WATERWORKS. City officials have been in conference with E. T. Archer & Co., 609 New England building, Kansas City, Mo.

Lakota, N. D., is constructin WATERWORKS. The engineer fo the improvement is T. R. Atkinso Bismarck, N. D.

Burlingame, Kan., is calling for bi on WATERWORKS improvement Black & Veatch, Interstate Bldg., Ka sas City, Mo., are the engineers.

Comfrey, Minn., is planning to co struct a SEWAGE DISPOSAL pla and has engaged Jones & Curtis, Fa mont, Minn., to prepare plans.

Plans for a SEWAGE DISPOSA plant for Gallup, N. M., are being pr pared by Burns & McDonnel, Intersta Bldg., Kansas City, Mo.

Newkirk, Okla., is planning to co struct a large amount of PAVING a has retained, as consulting enginee the Benham Engineering Co., Colco Bldg., Oklahoma, Okla.

Otis, Colo., is receiving bids on WATERWORKS system. The en neer is R. D. Salisbury, 1415 East C fax avenue, Denver.

The town of Washington, N. J., pla enlarging its SEWAGE DISPOS plant, adding septic tanks and enla ing sewage beds. The work is to done under the direction of Cly Potts, 30 Church street, New York

In constructing SEWAGE D POSAL and WATER SUPPLY s tems at the Industrial Home Women, Muncy, Pa., Albright & M bus, Land Title Bldg., Philadelp were called upon to prepare the pla

Lycoming County, Pa., is calling bids on two concrete arch BRIDG over the West Branch of the Susq hanna River at Williamsport. T county commissioners retained to p pare plans and supervise construct M. C. Krause, 335 Pine street, W liamsport.

Municipal Journal

Volume XLIII NEW YORK, SEPTEMBER 6, 1917 No. 10

RECENT IMPROVEMENTS IN WILMINGTON'S WATER SUPPLY

Rapid Filtration Plant, with Turbine-Driven Centrifugal Pumps, Constructed to Supplement Slow Sand Filters, Both to be Operated Side by Side—New Filters of Twelve Million Gallons Capacity.

By EDGAR M. HOOPES, JR.*

WALL FORMS AND COLUMN FOOTINGS, RODNEY STREET RESERVOIR.

The first steps toward improving the water supply of Wilmington, Delaware, were taken in 1902 when the Board of Water Commissioners adopted a program for completely rebuilding the plant at an expenditure of about $1,500,000.

The improvements did not contemplate any change in the source of supply, which since 1827 had been the historic Brandywine creek. Originating in the lower counties of Pennsylvania, this stream has a total length of about 35 miles and a drainage area of 335 square miles above the city of Wilmington. Owing to the number of towns and villages, together with various classes of manufacturing plants located on the water shed, the water is contaminated with both sewage and trade wastes to a marked degree. No efforts at purification were attempted until 1892, when a Sellers filter was installed, and this, until the advent of bacteriology, was supposed to be giving excellent results. The Sellers sand filter, which was of the upward type, marks one of the early efforts in the use of iron as a coagulent.

Following the repeated appearance of typhoid epidemics and a more general appreciation of the dangers of the source of supply, a new and more adequate plant was authorized in 1904. Five years later the following principal structures had been completed and placed in operation:

a—A new pumping station, including boiler house and coal bunkers with two 12-million-gallon high-lift Holly pumping engines, and four 200 h.p. Edgemoor boilers.

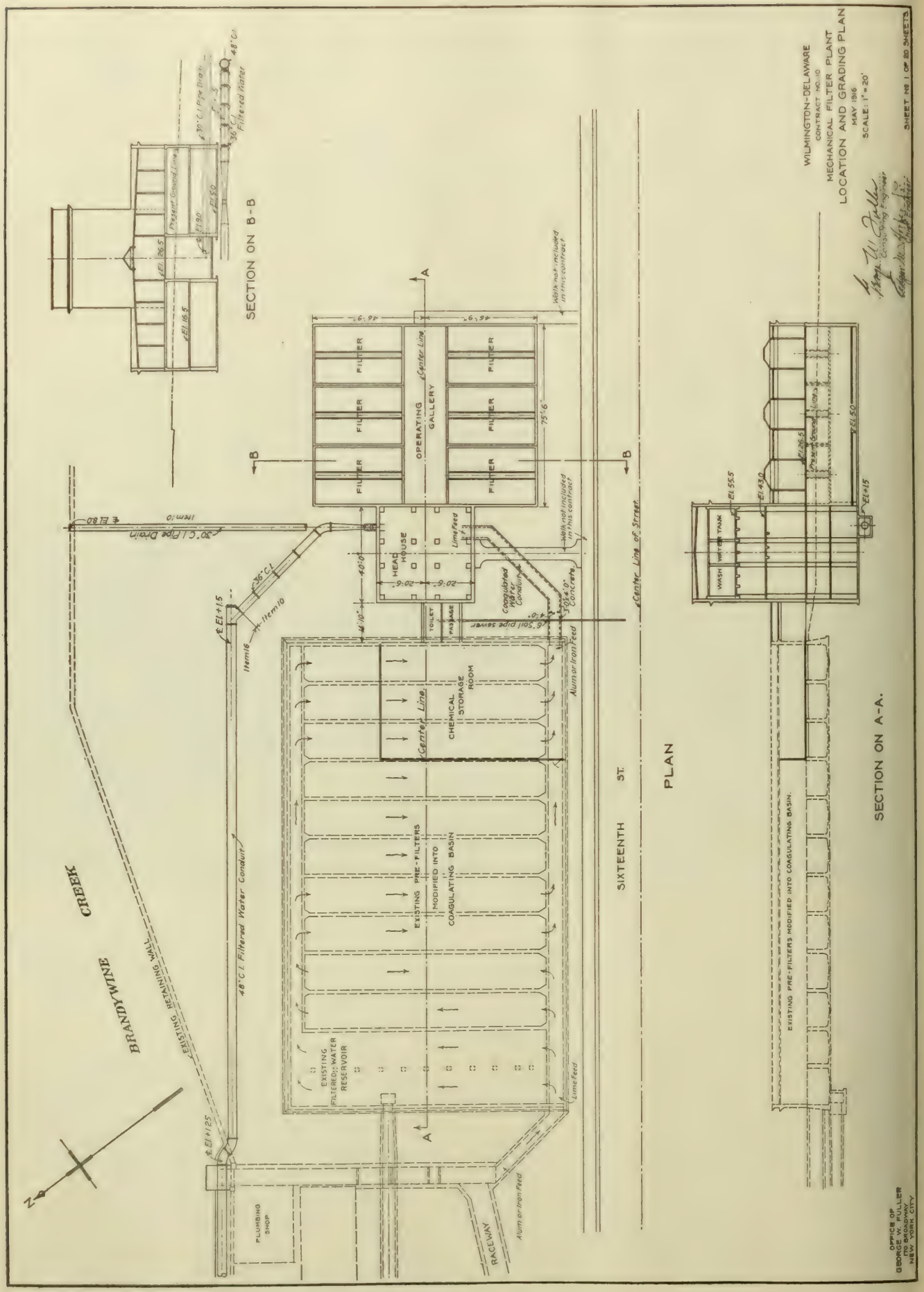
b—Preliminary or scrubber filters of the Maignen type, with a nominal capacity of 15 million gallons daily. The direction of filtration in these filters is upwards and the filtering media are coke, gravel and sponge clippings.

c—19,500 feet of 42 and 48-inch lock-bar steel pipe as forcing and distributing mains.

d—A sedimentation basin (Porter reservoir) of 35 million gallons capacity, of which 32 million gallons are available.

e—Two acres of covered slow sand filters arranged in six beds of equal area, and cleaned hydraulically by means of a Blaisdell machine.

*Chief engineer, Water Department, of Wilmington, Del.


WILMINGTON-DELAWARE
CONTRACT NO. 10
MECHANICAL FILTER PLANT
LOCATION AND GRADING PLAN
MAY 1916
SCALE: 1" = 20'
SHEET NO. 1 OF 20 SHEETS
SECTION ON B-B
PLAN
SECTION ON A-A.
SIXTEENTH ST.
BRANDYWINE CREEK
EXISTING RETAINING WALL
48" C.I. Filtered Water Conduit
EXISTING PRE-FILTERS MODIFIED INTO COAGULATING BASIN
EXISTING FILTERED WATER RESERVOIR
RACEWAY
PLUMBING SHOP
HEAD HOUSE
OPERATING GALLERY
FILTER
CHEMICAL STORAGE ROOM
TOILET
PASSAGE
Lime Feed
Alum or Iron Feed
Coagulated Water Conduit
6" Soil pipe sewer
Center Line
Center Line of Street
Work not included in this contract
WASH WATER TANK
EL. 555
EL. 430
EL. 115
EL. 50
EL. 180
EL. 165
EL. 90
EL. 86.5
Present Ground Line
30" C.I. Pipe Drain
36" C.I.
48" C.I.
Filtered Water
OFFICE OF
GEORGE W. FULLER
170 BROADWAY
NEW YORK CITY

f—A groined arch, filtered water reservoir of six million gallons capacity. The reservoir is located directly under the slow sand filters; the roof of the former serving as the floor of the filter beds.

Operation of the Plant.—Water is taken from the Brandywine creek at a dam located about one mile from the plant and flows by gravity through a canal or race to the preliminary filters. From the preliminary filters the water is conducted by gravity to the pumps, where it is raised to the sedimentation basin at an elevation of 285 feet above the pumps. From the sedimentation basin water flows by gravity to the slow sand filters and thence to the filtered water reservoir directly underneath. The city is supplied directly from this reservoir and is divided into three pressure zones; one of which requires repumping and one is supplied at a reduced pressure by means of a compensating reservoir of 40 million gallons capacity.

For the first two years of its operation the new plant gave entirely satisfactory results—both as regards sanitary quality of the water and operating costs. With the beginning of the third year, however, operating difficulties of a serious nature developed at the slow sand filters. Shrinkage cracks in the unreinforced concrete floors of the filters (which also serve as the roof of the filtered water reservoir) appeared in large numbers. The cracks extended longitudinally the full length of each bed at points midway between supporting piers and laterally as well. During periods of low temperature these cracks would open up, permitting most of the water to pass directly to the filtered water reservoir underneath, instead of taking the intended route through the underdrain and collector system. At such times the rate of filtration in the area over the cracks would be excessive and entirely beyond the control of the operator.

It also became evident that the preliminary treatment given the water did not adequately prepare it for slow sand filtration. The effect of removing the coarser suspended matter by the preliminary filters prior to sedimentation was to largely defeat the latter action at the sedimentation basin and to leave a very fine turbidity to be removed by the slow sand filters.

The behavior of these filters with applied water containing very fine clay particles was remarkable, but eventually there occurred a penetration of this material to the lower portions of the sand layer beyond the reach of the Blaisdell washing machine. This condition, combined with the structural defects before noted, reduced the yield of the filters greatly and caused high initial losses of head through both leakage and clogging.

The effect of operating the Wilmington filters under a negative head, or even the loss of head exceeded the depth of water on the bed, was to produce "air binding" to an extent which frequently prevented the passage of water through the beds. This was particularly true during the winter months when operating with negative heads in excess of eighteen inches—a condition which frequently occurred in those beds where leakage was excessive. The air binding in filters of either the mechanical or slow sand types is due to the production of a vacuum below the plane of greatest frictional resistance when the filters are operated under negative heads. Under such conditions air is not only released from the water in process of filtration, but will be drawn in from the outside unless the filter structure itself is tight. At the Wilmington filters air binding occurred from both sources.

Mr. Fuller's Report.—Such was the situation in 1915 when the Board of Water Commissioners was concerned not only with remedial measures but also with enlargement of the entire plant in order to keep pace with the rapid growth of the city. As radical changes in policy were indicated, it was decided to have a careful study made of the filtration needs as well as a report on future improvements. For this purpose the services of George W. Fuller, consulting engineer, New York City, were engaged and preliminary work at once inaugurated.

After a careful study of turbidity records, operating statistics and other pertinent data, Mr. Fuller reached

FILTER TANKS AND HEAD HOUSE FOUNDATION UNDER CONSTRUCTION.

the conclusion that it would not be practicable to lessen adequately the turbidity of the applied Brandywine water without the use of a coagulent. He further found that the existing slow sand filters were seriously overtaxed and in need of structural repairs; that the capacity of the main pumping station should be increased and that storage facilities for filtered water were unsatisfactory as regards capacity, location and elevation. The acquisition of additional water rights in the Brandywine was recommended and the possibilities of interruption to the existing filtered water supply, through breaks in the principal forcing and distributing pipes, carefully emphasized. Mr. Fuller found that the slow sand filters had made a surprisingly good record in the removal of clay, and that, with proper treatment of the applied water, excellent results might be predicted for the future.

Three principal filtration projects, together with other betterments, are included in Mr. Fuller's report and may be briefly summarized as follows:

Project No. 1: A duplication of the present slow sand filters at an adjoining site.

Project No. 2: A 12-million gallon rapid sand filter plant adjoining the present slow sand filters.

Project No. 3: A 12-million gallon rapid sand filter plant adjoining and making use of the present preliminary filter plant structures.

As the last project was the lowest in first cost as well as in operating expense, it received the immediate approval of the Board of Water Commissioners upon Mr. Fuller's recommendation. The estimated cost of the improvements was $750,000, and included the following items:

1. A new rapid sand filter plant with coagulating facilities of 12 m.g.d. capacity.
2. A new covered filtered water reservoir of 7.5 million gallons capacity.
3. Piping connections from the new filters to one of the existing Holly pumps and to three new centrifugal pumps to be installed.
4. New forcing mains and connections where required.
5. Repairs to present slow sand filters.
6. Baffles in existing sedimentation basin near slow sand filters.
7. Purchase of additional water rights up to the full flow of the Brandywine.

In the preparation of plans and specifications for the above work Mr. Fuller was assisted by his partner, James H. McClintock, Elmer G. Manahan and the Engineering Department of the Board of Water Commissioners. At the start of the work in June, 1916, Elmer G. Manahan became resident engineer.

NEW RAPID FILTERS.

The new filter building consists of a reinforced concrete substructure, containing the filtered water reservoir and filter tanks, with brick superstructure and headhouse. Slab and beam construction with concrete columns was substituted for the conventional groined arch treatment in the roof of the reservoir supporting the filter tanks. The filters, of which there are six, are grouped three on each side of a central pipe gallery, which contains the coagulated water conduit and wash water line, each of concrete, a 20-inch cast iron wash-water line, and 20 and 14-inch cast iron effluent pipes from each filter.

The roof of the pipe gallery serves as the operating platform supporting the operating stands and gauges. All valves are hydraulically operated, but stands were substituted for operating tables. The rate controllers and loss-of-head gauges are Builders Iron Foundry make.

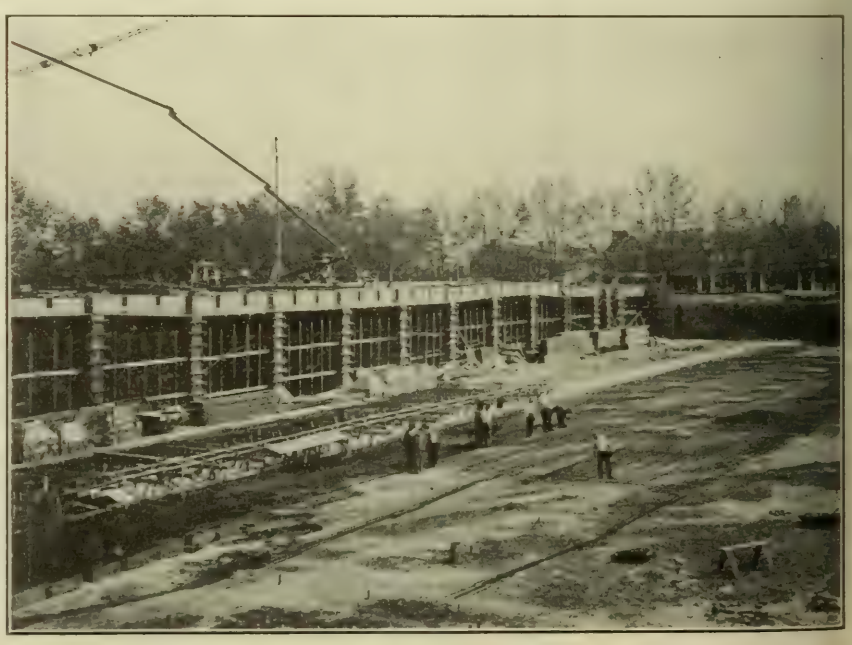
Each filter unit is grouped around a central gutter, the beds being 20 feet 6 inches by 36 feet, equivalent to 738 square feet in area. The effective depth of beds is 8 feet 6 inches. The filtering media consist of 18 inches of gravel in five courses, ranging in size from that passing a 2½-inch screen to that passing a 3/16-inch screen, and 24 inches of sand with an effective size of .67 mm. and uniformity coefficient of 1.19.

The strainer system consists of cast iron floor castings bolted to the effluent piping and cast in the concrete floor of the filter beds. The strainer manifolds are bolted to these floor castings, there being two center manifolds to each bed with 1¾-inch cast iron pipe laterals. The laterals are 4 feet 6 inches long, with two rows of ¼-inch holes (nine holes to a row), drilled and set at an angle of 30 degrees with the vertical axis of the pipe. The joints between the laterals and manifolds are caulked, as are also the lateral caps. The strainer system serves to apply the wash water. The wash water gutters are of reinforced concrete and arranged six to each bed on either side of the central gutter.

The capacity of the filtered water reservoir under the filters is 450,000 gallons. A 48-inch cast iron main connects this reservoir with the suction well of the new pumps. The installation of this line, part of which is below mean low tide in the Brandywine, was one of the most difficult tasks connected with the work.

In the headhouse are contained the alum mixing boxes and solution tanks. Lime slakers and lime solution tanks are also provided, all tanks having motor-driven stirrers. Orifice boxes and eductors are located on the first floor of the headhouse, from which the solution is piped to three different points of application. A proportionally controlled liquid chlorine apparatus is also located on the first floor, the control being regulated by Venturi meter installed on the filtered water line connecting the reservoir with the pumps.

The wash-water tank, which is located on the top floor of the headhouse, is waterproofed with a felt and pitch membrane supported by a brick lining. The ca-



COLUMN AND ROOF FORMS, RODNEY ST. RESERVOIR.

acity of the tank is 81,500 gallons. The tank is filled ith filtered water from a high pressure line connected ith the distribution system. The overflow of the wash ater tank is located at elevation 66, while that of the ottom of the filters is 16.5. The tank is supported by elve 20-inch by 22-inch reinforced concrete columns rming the framework of the headhouse, with four 20 ch by 20-inch columns carried up on a 10-foot square rough the center of the building. The principal gir ers are two in number, 18-inch by 36-inch, of rein rced concrete with two spans of 11 feet 4 inches and e of 8 feet 4 inches. The spacing is 13 feet from the nter of the outside columns to the center of the gir ers. Secondary girders are 12-inch by 30-inch of rein rced concrete on 4-feet 6-inch centers, with two spans 13 feet and one of 10 feet. The construction of the adhouse and wash-water tank was an interesting and fficult phase of the contract. The inside dimensions the tank are 35.5 feet by 35.5 feet by 10.5 feet.

OPERATION OF THE NEW FILTERS.

The contract for the new filters was awarded in May, 16, to the Roberts Filter Manufacturing Company, of arby, Pa. The engineer for the contractor was D. G. beel. The principal sub-contractor was J. S. Rogers ompany, of Moorestown, N. J. While the contract was t on a unit price basis, the cost, based on the engineer's timates of quantities, was $154,100. The filters were ompleted and placed in operation in June, 1917, and e final estimate indicates that the estimated cost will very slightly exceeded.

The filters have been operated since placed in service a rate of 2 gallons per square foot per minute, equiva nt to 2,000,000 gallons per day per unit. It is confi ntly expected that a rate of 3 gallons per square foot r minute can be obtained and maintained over a rea nable period of time with good initial quality of water. or turbidities under 40 p.p.m., 6/10 of one grain of alum r gallon has been found sufficient to properly coagu te the raw water. Turbidities requiring three to four rains per gallon have been encountered also, thus show g the wide range in operating conditions.

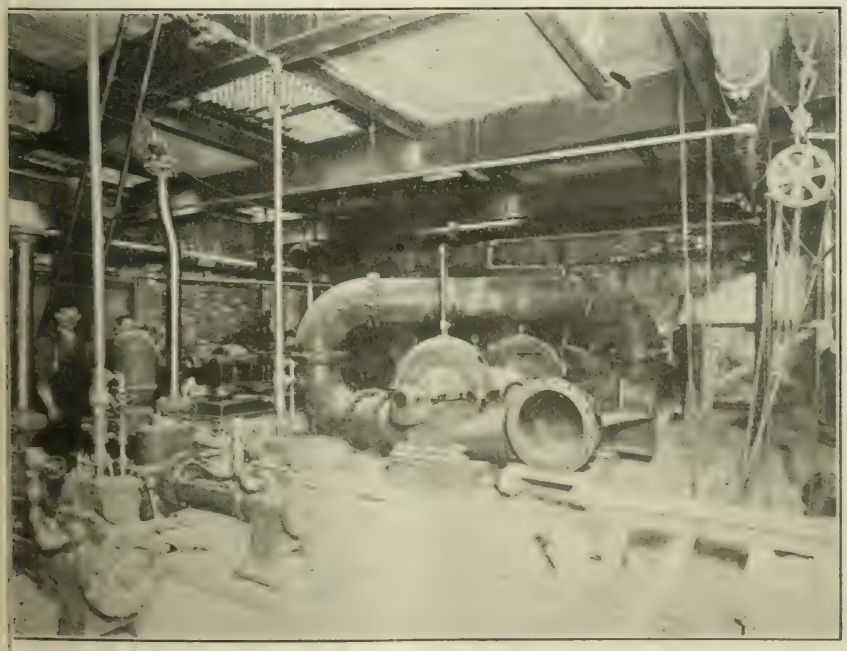
The average quantity of wash water employed has en 40,000 gallons for each wash, or approximately 2 r cent of the filter unit yield. The velocity of wash ater with control valve open is 2.7 feet per minute, resulting in very good suspension of sand and no lifting action on the gravel. The sanitary quality of the filtrate after the first few weeks of operation has been excellent.

NEW COAGULATING BASIN.

The new coagulating basin, which was a part of the filter contract, was constructed by altering the old preliminary filters which immediately adjoin the new filters. The beds of this filter are 14 feet 5 inches by 100 feet 8 inches and are ten in number. In addition, there is a clear water basin at the same elevation as the filter beds of 31 feet by 100 feet 8 inches. The filtering media of sponge, gravel and coke were removed from the beds, inlet and outlet wiers constructed at the ends and the necessary sluice gates installed for properly controlling the direction and volume of flow. The coagulent is applied just before the raw water enters the building and the flow diverted through the first two beds and clear well. Passing from these beds, the water enters a concrete conduit and travels thence back through the seven remaining beds at a greatly reduced velocity. Passing over the outlet wiers at the ends of these beds, the water flows directly to the new filters through a second concrete conduit. The period of retention in the coagulating basin varies from 45 to 60 minutes, but rapid flocculation occurs owing to the agitation of the water in passing through the first two beds and clear water well. The entire arrangement is exceedingly satisfactory and places to good use a structure which otherwise would soon have been discarded. A chemical storage house has been constructed over the three end beds of the basin and this is in turn connected with the headhouse by a short runway. A hydraulic elevator in the headhouse makes the handling of chemicals a matter of great convenience.

NEW TURBINE-DRIVEN CENTRIFUGAL PUMPS.

In September, 1916, a contract was awarded the Dravo-Doyle Company, of Philadelphia, Pa., for two 9 million gallon and one 12 million gallon DeLaval centrifugal pumps and turbines. The smaller units were to operate against a maximum head, including friction and suction heads, of 150 feet, and the larger unit against a maximum head of 290 feet. The contract price was $64,900 for the three units with condensors, combined wet and dry vacuum pumps, feed-water heater and two boiler-feed pumps. Operating conditions were 150 pounds steam pressure, with 30 degrees of superheat and a 28-inch absolute vacuum with condensing water at 75 degrees F. The manufacturer's duty guarantee on the large unit was 123.8 million foot-pounds per thousand pounds of dry steam, and on the smaller units 110.8 million foot-pounds. For the purpose of comparing bids, the highest duty guarantees were taken as a basis and the sum of $200 for each of the smaller units and $400 for the larger units, added to the lower bids for each million foot-pounds' difference in duty between the lower guarantee and the base guarantees. While maximum operating heads were given in the specifications, units with a high efficiency over a wide range of head were desired, and the bidder was required to guarantee the duties under minimum and average operating heads.



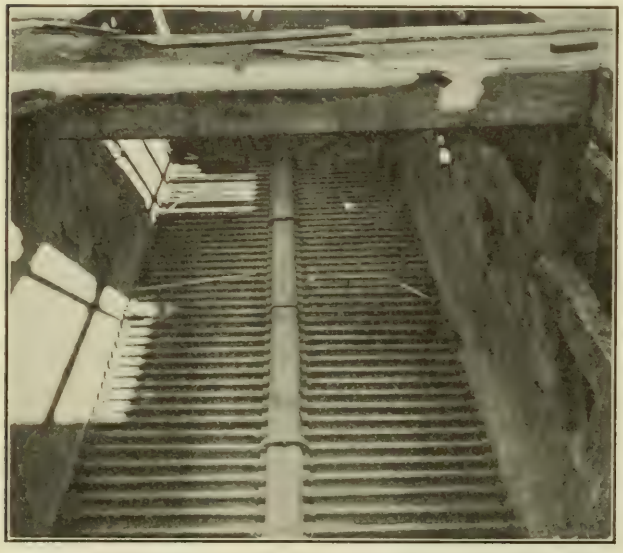
INTERIOR OF PUMP ROOM, SHOWING PUMPS AND TURBINES.

An outline of the installation is as follows: All main pumping units were to receive their suction under a suction lift of from 5 to 15 feet, depending

on the elevation of water in the suction well. Condensers were located on the suction side of the pumps in such a way that the circulating water for each condenser should be the suction supply for its main pumping unit. The condensate or tail pumps were to discharge the condensate into the open feed-water heater—the latter being located sufficiently above the turbine roof floor to permit the boiler feed pumps to receive their suction under a pressure head. Steam exhausts from the auxiliary pumps and boiler feed pumps were to be discharged directly into the open feed-water heater. The units mentioned have been installed and in operation in connection with the new filters since June of this year. They are used both for direct pumpage into the mains and for filling storage reservoirs.

While tests for acceptance have not as yet been conducted, the results of two months' operation indicate that the duty guarantees will be exceeded. It may be of interest to note that the 12 million gallon pump consists of two 18-inch double-suction pumps arranged in series. The speed of these pumps is 1,060 r.p.m., requiring 765 brake h.p. at the turbine. The turbine speed is 5,000 r.p.m., the ratio of speed reduction between turbine and pump being 4.72 to 1.

The smaller units are each 16-inch double-suction, single-stage pumps, operating at 1,200 r.p.m., and requiring 280 brake h.p. at the turbines. The speed of



VIEW OF A FILTER STRAINER.
Openings for Troughs Are Seen in the Side Walls.

the latter is 5,000 r.p.m. and the reduction ratio is 4.17 to 1. A reduction gear efficiency of 98½ per cent is guaranteed by the manufacturer. Wheeler-Edwards combined wet and dry vacuum pumps, Wheeler Condenser & Engineering Company's water-works condensers, and a Cochrane feed-water heater complete the installation. Builders Iron Foundry Company Venturi meters and recorders are installed on the discharge lines.

NEW FILTERED WATER RESERVOIR.

The contract for the reservoir was awarded in June, 1916, to Williams & Kinnamon, general contractors, of Baltimore, Md. Based on the engineer's estimates of quantities, the cost of the structure under the unit prices bid will be $134,800. Progress on the work has been delayed owing to unforeseen difficulties, and in September, 1916, the principal contractors were permitted to sublet the remainder of the work to the Consolidated Engineering Company, of Baltimore, Md. The reservoir is of reinforced concrete with covered top supporting earth fill, asphalt skating rink for children, and band stand. The dimensions are 249 feet by 268.5 feet by 15 feet, and capacity 7,500,000 gallons. In the design of the reservoir roof, slab and beam construction was again selected as against groined arches. The supporting columns are 21 inches by 21 inches square, spaced on 18-foot centers. The footings of the columns are spread to a 4-foot 9-inch square, 2 feet 3 inches high and 2 feet by 2 feet on top. Main girders are 18 inches by 32 inches, reinforced top and bottom, spaced on 18-foot centers, and secondary girders are 12 inches by 20 inches, spaced on 6-foot centers. The slabs are reinforced in both directions and are supported on four sides, the span either way being a distance of 6 feet. Originally, the slab thickness was 4 inches, but, owing to the difficulty of completely covering the steel, as well as in the interests of watertightness, the thickness was increased to 6 inches. A reinforced concrete division wall runs the length of the reservoir, dividing it into two equal compartments for cleaning or repair. The elevation of the flow line of the reservoir when full is 243, while the area it is to serve is already supplied by the reservoir under the slow sand filters at elevation 255.5. In order to place the two reservoirs in proper hydraulic relationship, the gate house of the new unit is supplied with standpipes which control the discharge into the reservoir at three different elevations. The minimum of these corresponds to the bottom of the reservoir under the slow sand filter, and the maximum to the flow line when the same reservoir is full. When pumping filtered water directly into the mains, the surplus can be allowed to back up directly into the reservoir under the slow sand filters, or into the new reservoir, without affecting the pressure in the area supplied, by operating the proper standpipe valves. For the present, the discharge lines from the new reservoir will be controlled by check valves which will open only when the hydraulic grade line between the two reservoirs is sufficiently lowered by heavy draft. To provide proper circulation of water, a small line is extended from the new reservoir at elevation 243 to a low-service compensating reservoir a few blocks away at elevation 145. Eventually a fourth pressure zone will be established which will be supplied directly from the new reservoir. Until that time, its principal value will be the storage of filtered water at adequate elevation within a very congested and important area.

The treatment of the roof of the reservoir by constructing a skating rink and band stand has struck a popular note in the community. The walls of the reservoir are 3 feet 6 inches at the base by 17 feet 9 inches high by 2 feet wide at the top. The earth embankment around the walls was considered an element in designing the reservoir, to resist the water pressure when filled. The portion of the reservoir roof not used for the skating rink (about two-thirds of the total area) will be covered with a 20-inch earth fill and placed in grass. The total volume of earth removed in excavating for the reservoir was about 22,000 cubic yards, of which amount over half will be required for embankments.

OTHER PLANT IMPROVEMENTS.

At the slow sand filters the work of removing the filter media and waterproofing the leaking filter floors is well under way. This project requires the removal of some 10,000 cubic yards of sand and gravel with the grading, washing and replacing thereof. The beds are waterproofed with alternate layers of asphalt and three ply felt. Over this membrane a 3-inch reinforced concrete slab will be constructed. To date, the filtering material has been removed from one bed and the waterproof membrane applied, but no concrete laid. It is hoped that at least three of the six beds, which are

by 362 feet each, may be repaired before extreme cold weather.

The baffling of Porter reservoir, which is the sedimentation basin for the slow sand filters, will not be attempted until next spring. By that time Wilmington will find itself in the unique position of operating side by side two excellent filter plants, one slow sand and the other mechanical. The operating results to be obtained will be awaited with much interest.

With the aid of an adequate engineering organization and the hearty support of the community, the supply portion of the Wilmington water works has been slightly more than doubled within one year. George W. Fuller and James R. McClintock have remained as consulting engineers throughout the work.

WALTHAM WATER WORKS NOTES

Preparing Comprehensive Plans of System—Progressive Metering Reduces Waste—Action of Water on Brass Pipes—Maintenance of Hydrants and Gates.

The water works of the city of Waltham, Mass., were placed under the charge of the city engineer in 1915. In the report for the year ending January 31, 1917, of city engineer Bertram Brewer, appear a number of interesting items concerning the operation of the plant during the previous year.

He states that no comprehensive plans of the system of water mains and services were ever made, but when the system was turned over to his charge he began the task of reducing such data as were available to some kind of logical shape and to gradually complete a plan of the entire system. Plans of the old work are well under way, and all new work is plotted and placed on record as an essential part of his routine work. Incidentally it may be said in this connection that the city engineer gets out an up-to-date atlas of most of the city every few years, which he believes is probably done by no other city in the country. This atlas is used by all the city departments and by many individuals and corporations.

Since 1912, the percentage of services metered has been continually increased, until at the time of this latest report it amounted to 53 per cent. At the same time, and undoubtedly as a result of this, the waste of water has decreased. The per cent of services metered and the average per capita rate of use or waste of water between the hours of 1 and 4 A. M. during the past five years have been as follows:

Year	Per cent. of Services Metered.	Consumption bet. 1 and 4 A. M.
1912	18½	61.3
1913	25	62
1914	34	51
1915	43	45.3
1916	53	43.7

A waste of even 43.7 gallons per capita per day is considered by Mr. Brewer to be altogether too high and to point to the necessity for a careful investigation into sources of waste in the entire system.

For some time it has been realized that the water supply of Waltham has a very noticeable effect on brass, brass piping in many cases having been completely destroyed in a comparatively short time. The city engineer last year asked the State Department of Health for advice in the matter, and a state chemist was sent to the city to make field analyses and ascertain the cause of this action of the water. Analyses were made to determine the amount of dissolved oxygen, of carbonic acid, and of alkalinity. It was learned that there was an unusual amount of free carbonic acid present, amounting to 2.86 parts at one station and 3.16 at the other. (The supply of Waltham is obtained from wells at two pumping stations.) The citizens were assured that this acid would have no injurious effect upon the human system, it being the same material that is used in soft drinks at soda fountains and in various bottled waters in very much larger quantities than it is found in the city water. The State Health Department advised against using lead or brass pipes for service pipes with this water, and stated that galvanized iron pipes also would be acted upon seriously by the water, the coating probably being dissolved within a short time. The carbonic acid can be removed by aeration and filtration, but this would involve a large outlay for new works and increased annual maintenance expenses for operation. Brookline was cited in this connection as having recently spent $200,000 for such aeration and filtration works.

Commendable attention is paid to the hydrants and gates of the system, nearly all of which were tested twice during the year. Attention, however, was called to the fact that there is carelessness in the use of the hydrants, the emergency man having been called out frequently to repair leaking hydrants only to find that it was merely a case of carelessness on the part of the user in shutting off the hydrant. In this connection Mr. Brewer suggests that it would be a good plan to have the Police Department informed about the details of the water works and other property of the city, the proper names of the different fixtures, and what city official is in charge of each; and he suggests that he would be glad to give special information of this kind to the Police Department from time to time.

FORESTRY BY NEW BRITAIN WATER BOARD.

Forestry of their water sheds is becoming more general with municipal water works plants in New England, and New Britain, Conn., offers a good illustration of such work being done in an unpretentious but effective way.

Re-forestration of the water sheds of this city was begun in 1916, when 10,000 red and white pines were set out on the east side of Shuttle Meadow Reservoir. The total cost was a little less than $14 a thousand. While authorities agree that, in that section of country at least, white pine is the best tree for this purpose, owing to the prevalence of the white pine blister rust in New England it was thought best in planting to alternate the white with the red pine, so that should the white pine fail there would still be enough red pine. The white pine trees were placed 6 feet apart. In its report for the year ending March 31, 1917, the board stated that both species are doing much better than it had expected, the total loss from all causes being less than 5 per cent.

"As an economic necessity, and in the application of true conservation and practical care of our various water sheds, the wisdom of re-forestration of the same cannot be questioned.

"In Burlington alone the city of New Britain is owner of over 2,000 acres of land. In the forest area of this large tract the chestnut tree blight killed almost all of the chestnut trees, which have been sold on the stump and are now being cut down, and as this species was the principal growth in most sections, it leaves this land denuded and unsightly. As soon as the lumber people get through we will begin to re-forest same."

The receipts for the year show that $659 was obtained from the sale of wood from the Burlington and Shuttle Meadow tracts, and that $167.91 was expended for trees and labor in the forestry work at Shuttle Meadow.

LANSING CONCRETE RESERVOIRS.

Novel Details in Design and Construction Methods—Distributing Concrete without Use of Tower and Chutes—Beam and Girder Roof.

By F. G. GORDON.*

Two 3,500,000 gallon reservoirs now under construction for the city of Lansing, Mich., present some unusual features, both in the design and in the contractor's plant for handling the work.

Each of the two reservoirs is 155 ft. inside diameter and 160 ft. outside diameter. The reservoirs are placed 12 ft. apart in the clear. The ground elevation varies from 94 to 113, which is the approximate elevation of the sidewalk of Cedar street which passes about 100 feet from the nearest points of the two reservoirs. The roof of the reservoir is at elevation 116.5, or a little higher than the Cedar street sidewalk. The bottom of the reservoir slopes from an elevation of 89.0 at the center to 92.0 at the circumference. On each end of one of the diameters is located a cleanout door, and leading from one of these is a vertical ladder to the bottom of the reservoir.

Water enters each reservoir through a 16-inch pipe which passes through the wall at elevation 110 and immediately inside the wall drops to the bottom of the reservoir, where there is a 90 degree bend. The portion passing through the wall is provided with a wall-spool made by casting a ¾-inch by 3½-inch fin on a standard sleeve in order to provide water-tight bond between pipe and wall. Inside each reservoir was placed an overflow pipe, composed of two lengths of 12-inch pipe, at the top of which is a funnel of ¼-inch steel plate riveted to a piece of 12-inch wrought iron pipe 17-inches long which is calked into the bell of the vertical overflow pipe. The top of this funnel is at elevation 115.5.

Each reservoir wall is designed as a ring. Three-inch channels spaced approximately 8 feet on centers are used to support the reinforcing steel. Three sizes of bars were used in this reinforcing; ¾-inch, 1-inch and 1¼ inches. After careful consideration of the various types of roof construction, the flat slab roof was decided upon. This is somewhat of a departure from past custom in reservoir designs and, so far as the writer knows, is the first instance of its having been employed. The roof is a 7½-inch slab supported by circular columns spaced eighteen feet center to center. The floor of each reservoir is six inches thick and is reinforced both ways to take care of temperature stresses. A tar and felt construction and expansion joint is employed at the juncture of the wall and the floor and around each one of the column bases. A valve vault located between the two reservoirs gives control to the inlet, outlet and overflow pipes.

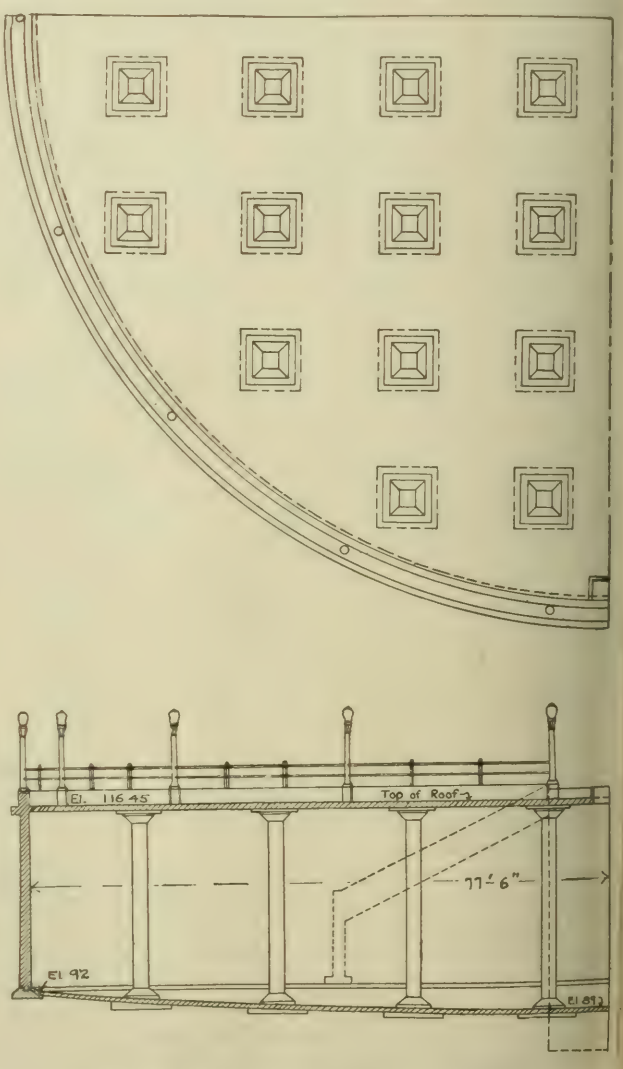
The bottom is reinforced with ½-inch bars placed 12 inches between centers both ways. Under each column footing is placed a foundation block of concrete 8 ft. square. The concrete floor is placed on top of these footings with expansion joints between the bottom of the floor and the top of the foundation. There are also expansion joints in the floor around each footing and 12 inches from sides of the same.

On one side of each reservoir is a stairway, with steps having 12-inch tread and 6-inch rise, and 6 ft. long. These and the supporting girders are of reinforced concrete, and a pipe railing is provided along each side of the stairway. This stairway descends to elevation 104.

The reservoirs are being built on a lot approximately 350 feet long and 290 feet wide. The back of the lot, which is adjacent to a railroad siding, is much lower than the front, so advantage was taken of this fact to locate the reservoirs so that the excavated material could be used in grading up to, and over their tops. An ornamental railing with light posts extends around the back half of each reservoir. When the grading has been completed shrubs and flowers will be planted and the lot will be converted into a small city park. Although the location of the reservoirs at the back of the lot was particularly desirable from the standpoint of the finished work, it occasioned the contractor trouble in disposing of his excavation and in handling his materials. The excavation was done by means of a drag-line excavator attached to a sixty-foot movable boom. The earth was dumped into a hopper on the high ground to the east of the excavation and was carried from there on an industrial rail-

*Assistant engineer to Dabney H. Maury, consulting engineer, Chicago.

ONE TANK NEARING COMPLETION.

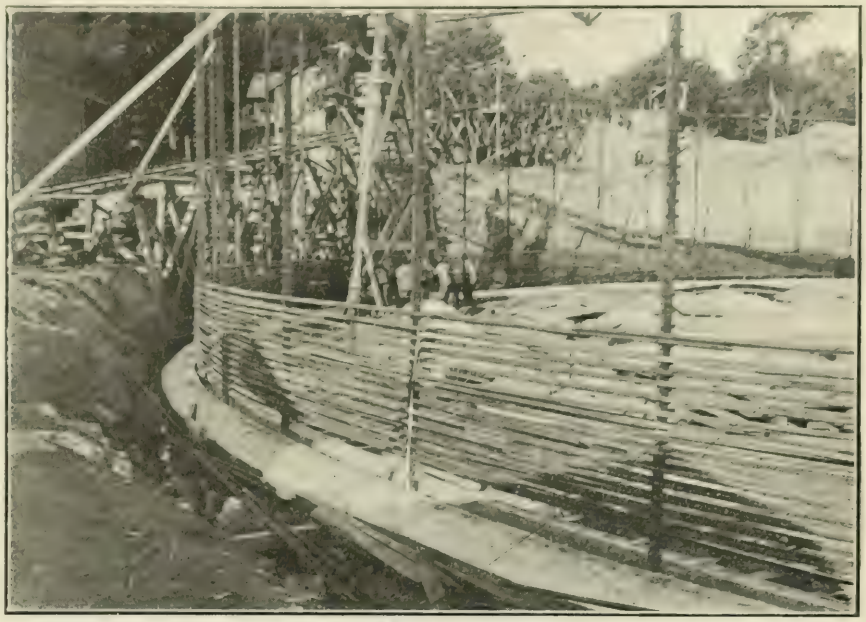


QUARTER PLAN AND HALF SECTION.

way to the top of the dump pile. A rather novel method was used to break up a number of brick and concrete foundations which were encountered in excavating. A drop ball was procured from a local foundry and this was dropped from a height of twenty to thirty feet onto the foundation to be shattered. This method proved so effective that it entirely displaced the use of explosives.

The contractor decided, in arranging his plant for pouring concrete, to dispense with manual labor wherever possible. Sand, gravel and cement are carried from the car to a point at the front of the lot by means of an inclined railway. This railway is extended on a trestle over the sand and gravel supply piles which are adjacent. Between these piles a hopper has been installed in a pit over a railway running to the mixer. Wooden bulkheads allow the sand and gravel to be piled up on each side of the pit. The hopper is divided into two compartments, one holding the required amount of sand for a batch and the other the necessary quantity of gravel. The hopper is filled with sand and gravel, struck off; the requisite amount of cement is added; and the whole dumped into a car on the track below.

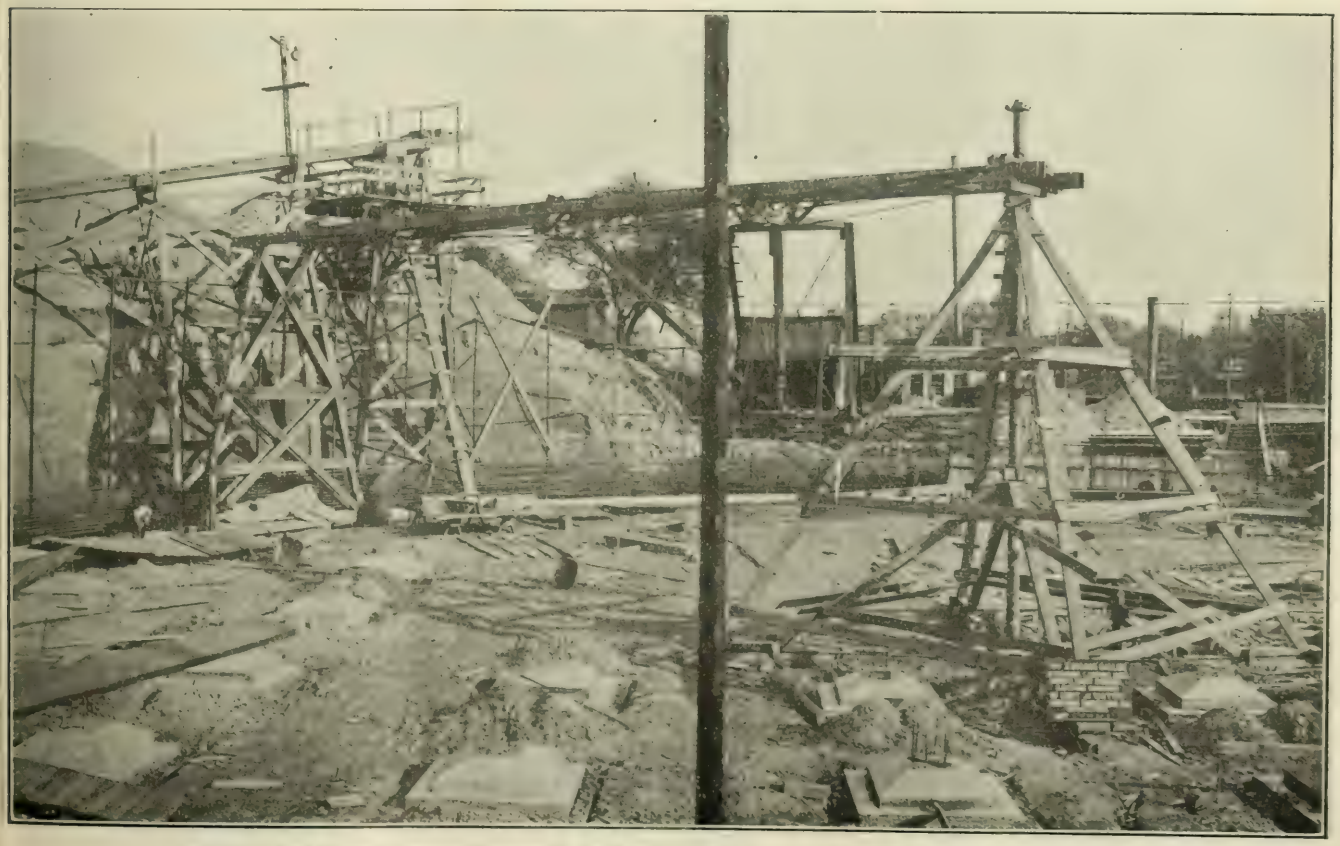
The specifications for this work prohibited the chuting of concrete. To comply with the specifications and at the same time avoid laborious handling of the concrete with wheelbarrows, a turn-table, pivoted at the center of the reservoir, was built. The inside diameter of each reservoir is 155 feet and the height at the wall is 23 feet



REINFORCEMENT AND INDUSTRIAL RAILWAY.

At the upper left hand of the cut on the right is seen the inclined track referred to, by which the contractor carried sand, gravel and cement from the railroad siding to an elevated portion of the area occupied by the work. In the foreground is shown a part of the reinforcement of the reservoir wall in place, and the groove in the concrete bottom by which the wall is bonded to it.

In the cut below is seen, at the right, the pivot about which the turn-table revolves; and at the left the traveling A-frame, the hopper by which the concrete is carried to place, and the mixed discharging into it.



TURN-TABLE FOR DISTRIBUTING CONCRETE TO RESERVOIR WALL AND BOTTOM.

10 inches. A circular track was laid around the circumference of the reservoir about 18 inches inside of the wall footing. This carried a heavy A frame some thirty inches higher than the top of the reservoir wall. A wooden truss extended from the top of the frame to the pivot at the center of the reservoir, this truss being supported by means of a collar at the pivot. The pivot was a heavy piece of pipe well braced in four directions. One of the wheels supporting the A frame end of the turn-table was geared to an electric motor. In pouring the walls, the mixer discharged into a hopper fastened to the A frame, the turn-table was revolved and the concrete discharged into the forms. In pouring columns, floor and roof, the concrete is carried across the truss of the turn-table on a car. One set of forms was used for the wall, which was poured in four-foot sections. A step joint was used as a construction joint between four-foot wall sections.

The total job includes 17,000 cubic yards of excavation, 3,500 cubic yards of concrete, 645,000 pounds of reinforcing steel and 18,000 pounds of structural steel. The contract was let to the Armstrong Engineering Company, whose bid of $73,683 was the lowest of the several bids submitted. Plans and specifications for the work were prepared in the office of Dabney H. Maury, consulting engineer, Chicago, Ill. The resident engineer is Jesse Potter.

MUNICIPAL WATER DEPARTMENT FINANCES

Practice of Several Cities as to Maintaining Finances and Accounts Separate from Those of Other City Departments.

By JAMES FURSE.*

The question of operating the water works plant of the city of Savannah, Georgia, entirely separate from all other departments of the city has recently been forcibly presented, for the reason that the city is now faced with the necessity of rehabilitating the plant. No reserve for depreciation has been created during the thirty years or more that the present plant has been in use, so that the city must now meet necessary and expensive repairs and renewals from its general fund or resort to the issue of bonds.

The Water Works Department, while it should not be operated at a profit, should be able to provide a depreciation fund, should take care of all extensions and betterments, should pay the interest on its bonds and provide a sinking fund for the redemption thereof, and furthermore should yield to the city some return on its investment. The last point is recognized by Richmond, Va., and Holyoke, Mass., both of which cities tax the water works department.

In order to ascertain how the water works department was operated in other cities, I wrote to twenty-six widely scattered cities, and received interesting replies from seventeen.

A brief summary of the replies is given below:

Atlanta, Ga.—Atlanta does not keep its water receipts separate and does not retain any special fund for the purpose of rehabilitating the plant.

Augusta, Ga.—All cash receipts from whatever source are placed in the common treasury. In 1912 the waterworks were mortgaged to secure a bond issue to be devoted to the erection of a levee; consequently the question arises as to whether any segregation of the water receipts would be valid.

Birmingham, Ala.—Except for an auxiliary plant furnishing water to North Birmingham alone, the waterworks plant is owned by a private corporation. The city of Birmingham purchases the water by meter and supplies the consumers.

Camden, N. J.—Water department receipts of this city are turned into the general treasury as general revenue, and annual appropriations are made for maintenance. There are no segregations of funds for specific purposes.

Columbia, S. C.—Columbia has a commission form of government. However, there is no segregation of the cash receipts of the water department.

Holyoke, Mass.—The moneys and accounts of the water department are kept separate and distinct from all other departments of the city. The water department meets its own interest on bonds and sinking fund requirements. The city pays the water department for water used in all branches of its government and in turn taxes the water department on the basis of its construction account.

Houston, Tex.—The water department is not operated as a separate institution. Water revenue is placed in the general fund.

Jacksonville, Fla.—The accounts of the water works have always been kept separate from other municipal accounts; the cash receipts from waterworks are entirely separate from other receipts and the moneys are kept in a separate account. Funds for the purpose of necessary renewals and replacements are set aside from time to time. The water department also contributes its proportion to the general sinking fund of the city.

Los Angeles, Cal.—The water department is under a City Commission known as the Public Service Commission. Receipts are turned in to the city treasury to the water revenue account. No reserve fund is set up to take care of depreciation, but the profits are sufficient to take care of this item as well as of extensions and betterments and of part of the interest and sinking fund of the water bonded debt.

Memphis, Tenn.—The water works plant is operated as a distinct department of the city, administered by three commissioners with separate officers and separate treasury.

Nashville, Tenn.—Receipts from water are handled as ordinary revenue receipts. No special or separate fund is kept in bank therefor.

New Orleans, La.—The sewerage and water board of the city of New Orleans keeps its receipts from water rent entirely separate.

Richmond, Va.—Revenues are not set up solely for use of the water works. However, the special accountant of the city prepares an annual statement of operations in which the water works plant is charged with depreciation, interest on bonds, reserve for redemption of bonds, and taxes.

Spokane, Wash.—Cash receipts for water department are kept entirely separate from all other city funds. Sinking fund is provided for redempton of bonds. Depreciation reserve account is provided to take care of the depreciation charged off each year, but no corresponding asset account (depreciation reserve fund) is set up.

Trenton, N. J.—Receipts from water rents are kept entirely separate and are used only for the purposes of the water department. A sinking fund for the redemption of water bonds is maintained exclusively from water rents.

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HINTS FROM EMPLOYEES.

The Water Department of St. Louis, in order to encourage the employees of the supply and purifying section to present suggestions in regard to improvements in the plant or in ways of doing work, or any other changes that might be desirable, offered vacations of from three days to a week for the six best suggestions sent in during each of two periods ending June 1 and December 1, 1916. A total of 161 suggestions were received, many of which were valuable, and nearly all were such as could be carried out to advantage, occasionally with modifications. The best result of the scheme, however, in the opinion of Commissioner Edward E. Wall, came from the interest aroused among the employees, each in his own particular work, and the evident study in detail which he gave to it in the hope that he might win the additional vacation as well as beat his fellows at the game.

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GET FIRE HYDRANTS INTO SHAPE.

Probably all are familiar with the story of the darkey whose cabin roof a visitor during a rain storm found to be leaking, and who said, on having his attention called to it: "You certainly don't expect me to go out in this rain and fix it, do you?" The next day, when the sun was shining, the same visitor found the tenant loafing in front of his cabin, and remarked that he supposed the roof had been fixed, to which came the reply: "Why for should I bother with that roof? It ain't leaking now."

Fire hydrants have not been freezing in the northern hemisphere during the past few weeks, but ten or fifteen weeks from now they may be; and that time is none too long for making a thorough inspection and overhauling of them in a city where they are numbered by the hundreds. We do not hear so often as we used to the excuse for failure of the Fire Department to control a fire that "the fire hydrants were frozen"; but there is still enough of such trouble occuring to furnish material for discussions every year or two before conventions of water works men and fire chiefs.

There is little excuse for a frozen hydrant if the city authorities only place absolute control of the hydrants with the water department. In the majority of cases a frozen hydrant is due to water standing in the hydrant or the ground immediately around it. This is caused by failure to close the valve tight; failure of the drip to open properly when the hydrant is closed, or of the ground around it to drain away the escaping water; or failure of the drip to close when the hydrant is open thus allowing water to escape through the drip under pressure and flood the surrounding ground. In some cases the hydrant connection is too near the surface and is itself frozen.

If any such conditions exist they should be ascertained now and remedied before cold weather arrives. The valve may be worn or damaged so that it can not be closed tightly, which condition can generally be learned by applying the ear to the hydrant stem, using it as an aquaphone. Prevention of such condition can generally be secured only by absolute prevention of the use of fire hydrants by any but firemen, and by examination by an expert of each hydrant immediately after each use of it.

If the ground is becoming water-soaked, this can be learned by driving into it near the hydrant a small pipe in which is a rod that fits into it loosely (the rod is to prevent dirt entering the pipe), then withdrawing the rod and noting whether water rises in the pipe. The remedy is to repair the drip, or lay a drain pipe from the drip to a sewer or some other outlet—preferably both. A freezing hydrant connection probably requires a lowering of the connection, and this may involve replacing the hydrant with one with a longer barrel. Water in a connection has no motion and is more likely to freeze than that in a main; and location below frost depth is therefore more necessary for a connection than for a main.

It is none too early to begin the detection and remedying of these conditions in climates where there is any danger of hydrants freezing.

WATERWORKS PATRIOTISM.

Much has been written concerning the value and necessity to the government of good roads as an aid in prosecuting the war, and the maintenance and extension of them is a duty of the cities and states even greater now than in the past. This, however, is not the only branch of public works which public duty and patriotism demand that we keep up to a maximum state of efficiency. The minimizing of fire losses by increased effectiveness of fire-fighting facilities is of the greatest importance, and this means the extension of water supply systems so that abundant water may be available for fire fighting and that every danger point be served by mains of ample capacity. Said President Wilson a few weeks ago: "At a time like this of emergency and of manifest necessity for the conservation of national resources, it is more than ever a matter of deep and pressing consequence that every means should be taken to prevent this evil" (destruction of property by fire).

The economic justification for fire protection is that it costs less than the value of the structures and their contents whose destruction it may prevent. It is true that waterworks extensions cost more now than they did, but on the other hand the rebuilding of burned structures and replacing destroyed property would cost more, and this increased replacement value of property justifies increased expenditure for its protection.

Nor is this the only or perhaps the most vital consideration. Replacing the destroyed property would withdraw labor from work essential to war preparations, and such property might itself have been employed in such preparations and its removal from service be a matter of serious consequence.

It is of the utmost importance that the water departments and companies in all of our cities keep their supplies and distribution systems at the topmost notch of efficiency, and they should not permit themselves to be deterred from this by high prices or any other considerations.

CHARGING RAILROADS FOR WATER.

The rates charged by a number of cities of Minnesota for furnishing water to railroads was made the subject of a questionnaire by the League of Minnesota Municipalities some weeks ago, and the ordinary monthly pumpage of the plant, the ordinary monthly consumption of the railroads, the approximate monthly gross receipts from water sold by the plant, and the rates charged to railroads, were ascertained for 27 municipalities.

The majority of them did not know both the monthly pumpage and monthly consumption by the railroads, although many of them gave an estimate of these. The figures furnished show that about one-half the amount pumped was used by the railroads in Brainerd and Morris; about one-quarter in Duluth and Two Harbors; while a number of other cities reported approximately 10 per cent. used by the railroads.

The rates to the railroad varied greatly. A flat rate per month was charged by several cities. Brainerd charged $485, Detroit $100, Elmore $4.16, Hinckley $85, Rush City $75, Perham $40, St. Cloud $50, Wadena $40. A larger number of cities metered the water and charged the following rates per thousand gallons: Crookston, 40c to 8c; East Grand Forks, 50c to 35c; Fergus Falls, 10c; Little Falls, 4c; Luverne, 10c; McKinley, 10c to 7c; Mankato, 90c to 45c; Morris, 7c; Minneapolis, 8c; Owatonna, 30c to 8c; Sauk Center, 8c; Two Harbors, 30c to 3¾c; Worthington, 4½c to 3c. The following cities metered and charged by the 100 cu. ft. as follows: Duluth, 15c to 8c; Ely, 27c to 5c; Moorhead, 30c to 5c; St. Paul, 6c.

RECONSTRUCTING COMPTON HILL RESERVOIR

Waterproofing With Asphalt Membrane—Interlocking Steel Sheet Piling Cut-off Wall—Extending Height of Slope by Concrete Retaining Wall.

The water supply of the city of St. Louis is pumped from the Mississippi river and passed through a purification plant, after which practically one half of the supply is pumped into mains connected to the Compton Hill reservoir, about 185 feet above city datum, the other half being delivered under direct pressure approximately 35 pounds greater than that supplied by this reservoir.

The reservoir was built 870 feet long, 540 feet wide and 22 feet deep and was completed in 1870. It was divided into two compartments by a middle dividing wall. It was mostly in excavation. A layer of puddle 2 feet thick was spread over the entire bottom and extended up the stepped slopes in the excavation to the puddle wall of the embankment, with which it was connected. A 6-inch lining of concrete was placed over the bottom, on top of the puddle.

More or less leakage developed in the reservoir, and in 1912 leakage tests showed heavy losses in the north basin through a large hole in the bottom where the floor had broken and sunk several feet. This hole was cleaned out and filled with concrete, the floor replaced and the entire slope and bottom carefully examined for other leaks, a few minor ones being found and repaired. In 1914 and in 1915 settlements appeared near the same point in the south basin and were repaired, together with smaller ones at other points. It was evident that something more permanent and more thorough than patching was necessary to make the reservoir safe, and it was decided to reconstruct it.

Many suggested schemes were designed and estimated in whole or in part, the one finally adopted possessing the advantage of considerably less cost than the others with equally safe construction. The plan included the driving of a cut-off wall of interlocking sheet piling through the core of the old embankment to bed rock; the waterproofing of the sides and the bottom of the basins with a membrane waterproofing laid on concrete and protected by concrete; a replacing of the old division wall with a new one of concrete, much heavier and 10 feet higher, supported on concrete piles and on a reinforced concrete cut-off wall carried to bed rock; and the construction of a reinforced concrete retaining wall on top of the slope, carried on the steel sheet piling and on concrete piles driven into the original ground. In addition, a new gate house of reinforced concrete and an ornamental fountain and stairway on the west front were provided.

Before reconstruction the capacity of the reservoir filled to elevation 174 was 56 million gallons; while the new construction permits raising the water to elevation 186 and increases the capacity to 85 million gallons. Bids for the work were received in August, 1916, and the entire reconstruction is now practically completed. Nineteen bids were received, their totals varying from $280,187 to $406,800, and averaging $336,509. The contract was awarded to the lowest bidder, the Hiram Lloyd Building & Construction Company.

Storage is necessary for the operation of the water supply system, since the pumping plant and mains are not adapted to maintaining a direct-pressure service during the maximum summer and winter consumptions. Consequently the specifications provided that work which required draining both basins should be completed between September 15 and December 15, 1915; this including tearing down the old gate house, dividing wall and gate chambers, and constructing a new chamber and division wall; also such strips of the floor and slopes of the north basin were to be waterproofed as were necessary to permitting of its being put into service while the south basin was emptied for reconstruction; then, when the south basin had been completed, it was to be filled and the north basin drained and reconstructed. The whole contract was to be completed and ready for service by December, 1916, but owing to certain delays (for some of which the city was responsible) the work is just about completed.

DIVISION WALL.

The main division wall is of reinforced concrete of semi-gravity section, 37 feet high, 30 feet wide at the base and 3 feet at the top under the coping, which is foot thick and 4 feet wide. The wall batters on both sides, the batter changing at three points, the successive batters being 9⅜ inches to the foot, 4 inches, 2 inches and 1½ inch respectively. Beneath the division wall on its center line, a concrete cut-off wall (which is practically a continuation of the division wall) 3 feet thick extends through yellow clay to bed rock, an average distance of 15 ft. In addition to serving as a cut-off, the wall offers considerable support to the division wall. The wall is supported also by four rows of reinforced concrete piles driving to bed rock, two rows on each side the rows being 4 feet apart between centers and the piles in each row 3 feet between centers. The wall is divided into three sections, each 129 feet long, by two expansion joints; and in addition, expansion joints are provided at the ends where the wall connects with the two gate chambers. The expansion joints are of the tongue-and-groove type. One side of the joint having been poured, this was covered with asphalt and asphalt impregnated felt built up to a depth of ¾ of an inch following which the other half of the joint was poured

against this. During the past summer, when the north basin was full and the south basin empty, this joint filling was partly squeezed out by the expanding concrete so as to project, at one point, more than 2 feet beyond the face of the wall. There was very little leakage through these joints.

The wall was calculated to resist the water pressure against one side, considerable impact from waves, and hydrostatic pressure under the part of the footing outside of the cut-off wall. Resistance to these several forces required the use of reinforcements, and for this there were used round deformed bars ⅝ inch in diameter spaced 15 inches on centers and extending the full height of the wall, following the contour of the face and 3 inches from it. In addition, ⅝-inch horizontal bars were spaced 24 inches on centers. At the expansion joints, additional vertical and horizontal bars were placed in the upper 12 feet of the wall, the horizontal bars being bent to fit closely the tongue and groove of the joint.

The gate chambers at the two ends of the wall are of reinforced concrete, carried on concrete piles driven to rock and on a concrete cut-off wall 3 feet thick and continuous with that under the division wall.

All the concrete in the division wall and gate chambers is mixed one sack of cement to each six cubic feet of aggregate, the proportions of sand and coarse aggregate being such as to produce a maximum density, the mixture being practically 1:2½:5. Large stones from the old division wall and chambers could be used as plums in the concrete of the curtain walls, division wall and the fill around the chambers, provided they were well bedded and kept 6 inches away from the face of the forms and from each other. Stones not so used (6,750 cu. yds. were taken out of the old walls) were crushed and used as coarse aggregate.

WATERPROOFING BOTTOM.

The method adopted for waterproofing the bottom was much the same as that which had been used on the bottom of the basins at the Chain of Rocks, where the underlying stratum was quicksand. As already described, the original bottom of the Compton Hill basins was puddle covered with 6 inches of concrete. The surface of this concrete was very rough and the stones projected above the mortar, the latter being so soft in spots that it could be picked out with the fingers. In order to secure a surface on which waterproofing paper could be laid, this concrete was leveled up with 3 inches of 1:6 concrete, laid in blocks about 8 feet square with half-inch expansion joints between them filled with an asphaltic joint filler. On this new concrete was laid a waterproofing consisting of six layers of pitch and five layers of 14-pound pitch-impregnated long-fiber wool felt, the layers alternating and the whole being thoroughly cemented together. The war has made the securing of good felt very difficult.

To protect this waterproofing from injury, it was covered with 3 inches of concrete laid in blocks which broke joints about 2 feet with the blocks below, the half-inch joints in these blocks being filled with asphalt filler. This concrete lining was troweled to a smooth surface.

WATERPROOFING SLOPES.

The inner face of the embankment had a slope of 1½ to 1 and a vertical height of 26 feet, all but the upper 2 feet of which was lined with limestone blocks 16 inches thick laid on an 8-inch bed of macadam. Before applying waterproofing, the exposed faces of these stones were cleaned of all loose material and covered with a 3-inch layer of 1:6 concrete laid in strips 8 feet wide, with ½-inch expansion joints between strips and a horizontal one at the middle of the slope. The concrete was thoroughly bonded to the paving blocks by removing one block in every 64 square feet and filling this space with concrete as the pouring proceeded.

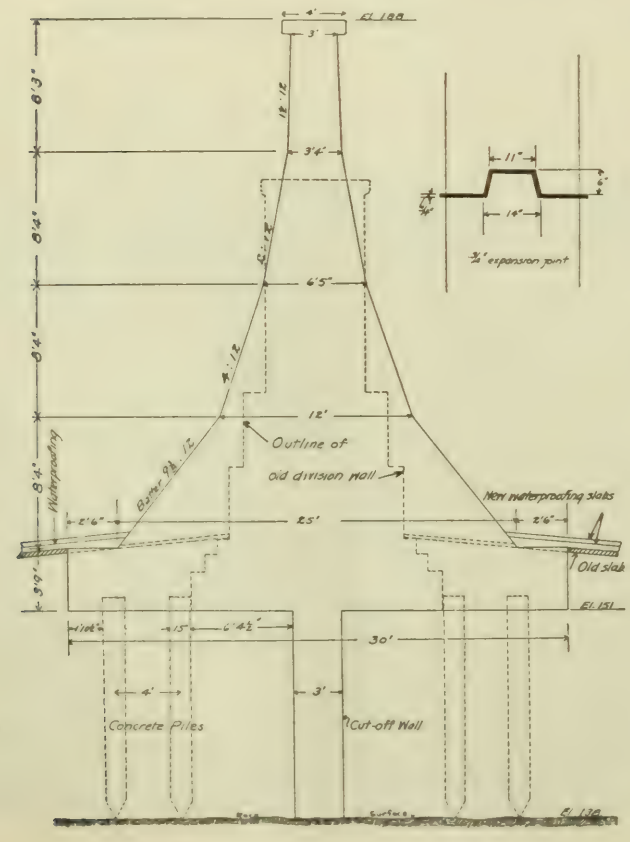
When the concrete had set, it was mopped with an asphaltic base primer coat made by dissolving asphalt in benzine, and was then covered with six layers of hot

NORTH BASIN OF COMPTON HILL RESERVOIR.

Division wall at the extreme right. Ramp for teams at further end of wall. Sides and most of bottom covered with concrete ready to receive waterproofing.

asphalt and five layers of 14-pound asphalt-impregnated felt. Asphalt was used instead of pitch in order to avoid the slipping of the waterproofing on hot days, which would be apt to occur with pitch, and in order to secure a material which would remain pliable under water Bermudez Lake asphalt, with a melting point of about 180 degrees, or one equivalent in all respects, was required.

Over the waterproofing was placed a protective slab of concrete 3 inches thick, which breaks joints with the slab below. Reinforcement of No. 23 triangle wire mesh is imbedded in the upper 10 feet of the bottom layer and in the entire area of the covering layer of concrete. At the top of the bank this mesh is securely fastened to ½-inch bars spaced 12 inches between centers and imbedded in the concrete of the retaining wall, thus providing anchorage for the upper half of the strip. The reinforcement in the lower half is secured to a ⅝-inch horizontal bar 6 feet long, which in turn is wired to four steel dowels set in the concrete of the bottom layer. Where the slope joins the bottom, the slope slab extends out over the bottom about 6 feet, being thickened to 15 inches at the angle, thus providing additional anchorage, as in the bottom all expansion joints are filled with asphaltic filler. For the first 200 feet of top laid, the anchors for the lower half of the strip were not used and the corner angle at the bottom was much thinner. The lower concrete, placed dry, at first was broomed over with grout, leaving a fairly rough surface on which to mop asphalt and lay paper. Later, to make the mopping easier, the surface was smoothed by coating with mortar and troweling. On a very hot day, under the direct rays of the sun, the temperature of the asphalt and paper reached more than 140 degrees, even though laid the afternoon before, and when the top was placed over this, concrete and paper both began to slide down the slope. Further trouble of this kind was prevented by changing back to the rougher broomed surface, by thickening the base, and by using iron pin anchors on the lower slab: though a small section of paper on a 30-foot section of the east slope, placed in the morning, started to slide in the afternoon of a very hot July day before the top layer of concrete was placed.



TYPICAL SECTION OF DIVISION WALL.

A concrete wall of semi-gravity section 37 ft. high, supported on a concrete cut-off wall and concrete piling.

STEEL SHEET PILING.

To provide against the possibility of a break or other cause of leakage through the waterproofing, a sheet piling curtain wall of interlocking steel piling was driven around the reservoir, extending from the top of the old bank to bed rock. Such a construction at the Chain of Rocks basins had effectually stopped quicksand movements and had been in place for six years without damaging corrosion. The steel piling at Compton Hill is driven through yellow clay which it is believed will prevent corrosion. Lackawanna arched web section weighing 40.83 pounds per lineal foot and 14 inches wide (making 13½ inches of finished wall) was driven in lengths varying from 34 to 50 feet. The city made borings at intervals of 25 feet along a line 10 feet outside of the piling in order to determine the depth of piling required. The contractor was paid for the full length of every pile driven, including any that might be above grade and had to be cut off, and also for capping with concrete all piling that was below grade. The rock bottom reached by the piling varied considerably from the boring depths.

This piling projects 12 inches into the footing of the retaining wall, and the footing reinforcement is run through holes burned in the piling by means of an oxy-acetylene burner. At the gate chambers this piling interlocked with piles which were embedded in the concrete wall of the chamber and of the footing beneath, thus forming a continuous cut-off wall around each basin.

RETAINING WALL.

As already described, the entire reservoir was surrounded by a reinforced concrete retaining wall so as to increase its capacity. This wall is supported on the steel sheet piling and on two rows of reinforced concrete piles 20 feet long, one on either side of the sheet piling and 10 feet apart on centers. They were driven about 5 feet into the original yellow clay, which has been undisturbed during any work on the reservoir. The footing of this wall is about 9 feet wide and 3 feet thick, the inner face being poured against the stone paving blocks on the slope. The waterproofing and the upper concrete slabs overlap it about 6 feet to provide a watertight bond. The wall proper is vertical, 10 feet high and 18 inches thick, of cantilever design.

The concrete in the base below the ground is composed of one sack of cement to 6 cu. feet of concrete; while above the ground line one sack of cement was used to 4½ cu. feet of concrete, the aggregates being Meramec river sand and hard crushed limestone one inch and smaller. Ten pounds of hydrated lime was used to each sack of cement, and the mixing was continued not less than 3 minutes after all the materials were in the mixer.

The lime acts as a waterproofing, serves to make the concrete pour more easily, prevents separation, and gives a much lighter appearance to the wall. When the concrete is mixed fairly dry it is very gummy and hangs together and to the steel, causing separation lines where it is not well spaded along the face; but this is prevented by making the mixture a little wetter. The 3-minute mixing has been used in the Water Department specifications since 1913 wherever waterproof concrete is wanted, as has also the ten pounds of hydrated lime

to each sack of cement. Results have been very satisfactory and the difference in the appearance of the resulting concrete from that mixed from ½ minute to 1 minute is very marked. It can be carted over 300 feet and the carts dumped clean without scraping and without any separation of the aggregates. From the inspection standpoint an added advantage is in the additional time given for proper placing of a batch.

Reinforcement to permit the wall to act as a cantilever is provided by ⅝ inch vertical bars spaced 10 inches on centers. There are no expansion joints in the wall, and horizontal reinforcement is provided to distribute temperature cracks. The horizontal reinforcement is spaced 3 inches from the inner face and 2½ from the outer, and amounts to a little more than one-half of 1 per cent of the sectional area of the wall. The wall forms the sides of a rectangle 834½ feet long and 505¼ feet wide. The walls poured in the hottest parts of the summer show small hair cracks which generally appeared at the end of the depressed panel shortly after pouring; but these have not opened visibly with changes in temperature, although the thermometer has been as low as 12 degrees below zero. Provision was made for painting the inside of the wall with a bituminous coating to minimize discolorations on the outer face and to reduce possible algae growths.

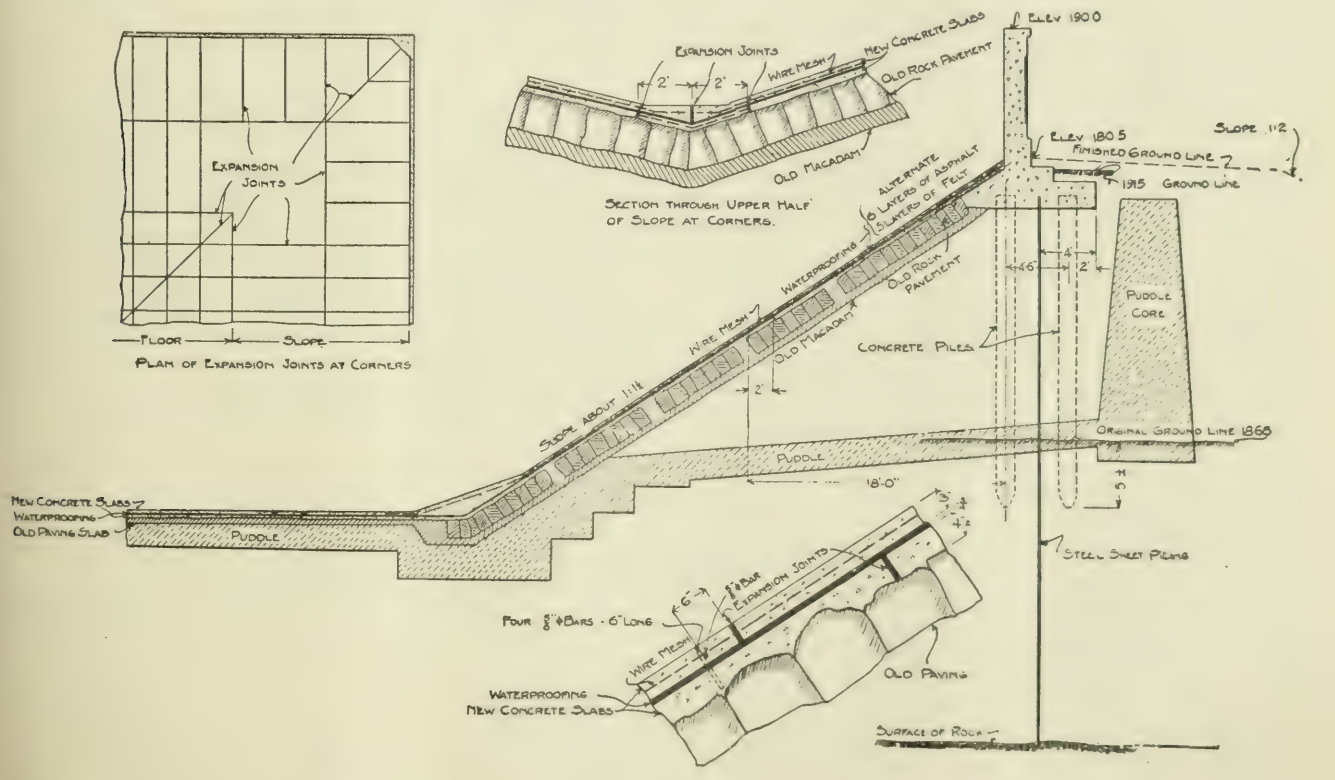
The concrete piles under the division wall were required to be pre-cast and those used in the rest of the work could be either pre-cast or made in place, but the contractor elected to use pre-cast piles throughout, making them in a section 12 inches square with one-inch chamfers at corners, and straight throughout the length except at the point, where they taper to 8 by 8 inches in a length of 12 inches. At first, curing for 30 days was required, but later, piling which had been cast only 10 days was driven by 400 blows of the Vulcan hammer through 15 feet of moist yellow clay to bed rock, with no injury, not even the spalling of the head.

CONSTRUCTION METHODS.

The old limestone masonry division wall and gate chambers were drilled 6 feet deep with churn drills and loosened or thrown down by blasting with 3-stick charges at the end of each shift (work was carried on both day and night). Two stiff-leg derricks, mounted on triangular towers 16½ feet high with 3.3½ by 3.3½-foot base and having 40-foot masts and 80-foot booms, were used to remove the old stone and later to place plums in the new wall.

The concreting plant was mounted on a 12-foot gauge track, one rail being the same as that used for the derricks. It was placed about 20 feet south of the center line of the wall and comprised a ¾-yard Marsh-Capron mixer operated by a 50-h.p., 220-volt, a. c., 3-phase motor; also a timber tower, bolted throughout, 70 feet high, in which traveled a bucket at a speed of 75 feet per minute and delivered the concrete to self-supporting gravity chutes. For both wall and chambers, sectional wood forms about 8 feet 6 inches by 6 feet 3 inches for the wall, and 8 feet 6 inches by 15 feet for the chambers, were used, the wall forms being handled by a traveling gantry crane of 40 feet span. The wood forms were tied together by ½-inch rods, two to each section of form, placed horizontally near the end of each section and in three rows to each lift. These rods, some of them more than 25 feet long, were slipped into closely-fitting spirally wrapped paper casings, from which they were withdrawn easily after the concrete had set. When the rods had been withdrawn, the paper was unwound for about 18 inches at each end of the hole and it was then filled with mortar.

For driving the sheet piling the contractor used a No. 1 Vulcan hammer in 70-foot leads, which were guyed laterally to dead men. In driving the steel piling it was found that there was a tendency for it to kick back at the bottom, so that the piles gradually worked away from the perpendicular. To remedy this, twenty-two



WATERPROOFING ON BOTTOM AND SLOPES OF RESERVOIR.

A layer of concrete, leveling the old surface, is covered with a five-ply waterproofing membrane, and that is protected by a three-inch layer of concrete.

wedges were used, made by splitting a pile longitudinally through the middle of a web and riveting each half to a tapered piece of steel plate ⅜ inch thick, thus making a pile 13½ inches wide at the top and 25½ inches at the bottom. The number of blows necessary to drive a 50-foot pile generally varied from 378 to 604, 146 blows being the least used on any pile.

For placing concrete on the slopes, another traveling plant was used consisting of a steam-driven mixer and engine mounted on a platform on wide-gauge trucks traveling on the same tracks as the other plant. The bucket carrying the concrete traveled on an I-beam boom which was kept at the same inclination as the slope that was being concreted and about 8 feet above it. Progress in this work was slow, and it was decided to pour the lower half of the bottom slab from the tower plant, and the upper half of the bottom slab and all of the top slab by the slope machine. Another steam-driven mixer was used solely for both top and bottom slabs of the bottom of the basin.

The work was in the direct charge of Hiram Lloyd for the contractor, Charles E. Gove being superintendent during 1916. For the city, the work was under the direction of water commissioner Edward E. Wall. The preliminary estimates, the plans and the specifications were prepared by S. W. Bowen. The total cost of the work was approximately $305,000.

GOOD SEWER WORK FOR CAMP TAYLOR

Seepage Into Vitrified Pipe and Segmental Block Sewer Very Low in Spite of Hurried Work in Saturated Ground—Figures of Seepage Measurement.

By D. R. LYMAN.*

There was recently completed, extending from the Beargrass interceptor of the sewerage system of Louisville, Ky., a sewer 12,185 feet long to serve Camp Taylor, the United States Army cantonment, in which 42,000 drafted men are to be trained for service. The sewer follows the meanderings of Beargrass creek in the flat bottom land, crossing under the creek 6 times, the grade of the invert being at all points lower than the bed of the creek. The sewer is 30 inches and 24 inches in diameter, the 30-inch section being constructed of American Sewer Pipe Company's vitrified segmental blocks, and the 24-inch section being of vitrified pipe. The former is 7,289 feet long, the latter 4,887 feet. The average cut is about 13 feet and the soil is yellow and blue clay, bearing water at a depth of about 8 feet.

Owing to the proximity of Beargrass creek and a row of hills on each side of the creek, a large amount of ground water was encountered continuously throughout the work, and pumping was constantly necessary in the 30-inch section. Portland cement mortar, mixed 1 to 1, was used for both the 30-inch blocks and the 24-inch pipes. No unusual precautions were taken to make the joints watertight. The work was very much hurried all the time owing to the necessity of completing it before the arrival of drafted men at Camp Taylor. To facilitate the construction, two contracts were let on July 7th on the cost-plus-percentage basis, one for the 30-inch and the other for the 24-inch sewer, with a time limit of 60 days. The work was completed and entirely celaned up on August 22nd, 16 days within the time limit.

It was anticipated that the combined effects of extremely rapid work, large amount of ground water, and the large number of joints in the block sewer, would result in abnormal infiltration. To determine whether this was the case, careful measurements of the seepage were made immediately after the completion of the sewer, and, contrary to expectations, the amount of infiltration was less than the amount indicated by several authorities on sewer construction as reasonably to be expected. In Folwell's "Sewerage," for instance, it is stated that with care the infiltration can be kept as low as 1 cubic foot per second in 30 to 100 miles, but in the case of this sewer, laid under adverse conditions, the infiltration was found to be 0.57 cubic foot per second per 100 miles on the 24-inch pipe, and 1.36 on the 30-inch block sewer. It was expected that, owing to the large number of joints in the 30-inch block sewer, the amount of infiltration would be greater than in the 24-inch pipe; but it was shown by these tests that the infiltration per foot of joint was greater in the pipe than in the segmental tile, the former being 0.225 gallon per day per foot of joint, and the latter 0.12 per foot of joint. The results of the test are shown in the accompanying table.

The plans for this sewer were drawn by the Department of Engineering of the city of Louisville, and the construction was carried out by J. B. F. Breed, consulting engineer, and John Chambers, supervising engineer, acting under special appointment from the Fiscal Court of Jefferson county.

INFILTRATION TESTS ON
Jefferson County Cantonment Sewer, Louisville, Ky.
Made August 22, 1917.

24-in. Vitrified Pipe Sewer and 30-in. Amco Vitrified Segmental Block Sewer.

Length of 24-in. tested, 4,667 ft. = .88 mile; Grade 0.24%
Length of 30-in. tested, 6,600 ft. = 1.25 mile; Grade 0.12%

	Cu. ft. per second
Capacity of 24-in.	11
Capacity of 30-in.	14
Infiltration, 24-in. sewer	.005
Infiltration, 30-in. sewer	.017
Infiltration, 24-in. sewer, per mile	.0057
Infiltration, 30-in. sewer, per mile	.0136
	Gallons per day
Infiltration, 24-in. sewer, per mile	3744
Infiltration, 30-in. sewer, per mile	8853
Infiltration, 24-in., per foot of joint	0.225
Infiltration, 30-in., per foot of joint	0.12

MOTOR TRUCKS IN PORTLAND.

Some details concerning the operation of three motor trucks in Portland, Oregon, have been sent us by the city engineer, O. Laurgaard. The Bureau of Highways and Bridges of the Water Works Department operates one gasoline truck of 2 tons capacity, and the Bureau of Sewers operates two 1½-ton gasoline trucks.

The figures from Dec. 1, 1915, to Nov. 30, 1916, of a 1½-ton Federal truck used by the Sewer Department, are given by Mr. Laurgaard as follows:

Gasoline	Gals.	2,071½
Lubricating oil	Qts.	379½
Transmission oil	Qts.	31
Cup grease	Lbs.	2
Equipment		$28.53
Repairs		37.29
Miscellaneous cost		6.76

The total mileage for the year was 13,021 miles. This gives about 6.3 miles per gallon of gasoline.

The Bureau of Highways and Bridges, using a 2-ton Packard, with a mileage of 6,089 miles, used the following materials:

Gasoline	Gals.	1,414½
Lubricating oil	Qts.	711
Transmission oil	Qts.	33
Cup grease	Lbs.	9
Kerosene	Pts.	29
Tire cost		$113.54
Equipment cost		23.08
Repairs		175.78
Miscellaneous cost		17.40

*Chief Engineer, Dept. of Engineering, Louisville, Ky.

The city of Portland maintains a municipal garage and repair shop, and keeps an accurate account of the mileage of each truck, the amount of gasoline and oil that it uses and the cost of tires, repairs and other items of maintenance and operation.

MACHINERY IN TRENCHING

Three Methods of Varying Efficiency Employed by Different Contractors—Trench Excavators and Grab Buckets Used in Different Ways.

Sometimes descriptions of incorrect methods of doing work are quite as valuable as those of doing work well. How not to do it is quite as valuable knowledge as how to do it, at least to the extent of showing what modifications of plans not directly applicable to a particular case can not be made with satisfaction. The jobs here described will therefore be anonymous as to contractor and location and each reader can draw his own lessons and apply them to his own problem.

The period of operation covered by the observations was one of the best of weather, rather hot and dry, with little water in the trenches. The soil was stiff clay, standing with only occasional vertical sheeting and a single horizontal ranger if any. The lower half of one trench was through a rather soft shale which could be picked or dug with a steam-shovel, but was sometimes blasted. The streets were paved with brick or asphalt and but one of them had street car tracks and in that one the sewer line was along the curb so that neither tracks nor water mains were interfered with. In short, the conditions were nearly all of them very favorable to rapid and economical construction.

The first contract described is of concrete pipe 48 to 36 inches in diameter, of which a length 142 feet of 48-inch with average cut of 11 ft., and 440 feet of 42-inch with average cut of 10.6 ft. was laid out and partly back-filled in 12 days. No compacting of back-fill was done except dumping from dump-car. The 142 ft. of 48-inch pipe was laid in 2 days.

A Keystone trench excavator was used, being a bucket on the end of a lever arm hinged to the end of the boom of the machine so that the bucket can be thrown out almost to the limit of the sum of the lengths of boom and arm and then drawn toward the machine, digging and then lifting the excavated material and dumping it into car or wagon alongside. The machine stands on the pavement at the end of the ditch and moves along ahead of the trench by its own power. The bucket will dig a trench about 30 inches wide directly and took out the full 11 feet depth of this trench without difficulty. The trench being more than 30 inches wide, in hard clay with a foot or so of disintegrated shale in its bottom, the machine could not take out the full width, although it could doubtless have done so with softer material, and did take out about 42 inches width. The remainder was knocked down to the bottom of the ditch with pick from below or bar from above, making the sides smooth enough for lowering the pipes. The pipes, which are 4 feet long and weigh about one ton each for the 42-inch size, were lowered to place in the trench by a regular 4-legged pipe derrick and differential pulley and a stirrup hooked over the bell end of the pipe. If the pipe was not rolled to the ditch so that it would lower right side up, it was readily turned after lowering by moving the stirrup down one side and then lifting so that the pipe was rolled and shifted. It could thus be centered, the spigot end pushed into the bell end of the pipe already laid, and the necessary adjustment to exact grade made easily. Pipes were handled and set ready for cementing joints in 5 to 10 minutes each, according to the amount of adjustment needed.

The material dredged from the trench was dropped into a dump-car running on about 100 ft. of track laid alongside the trench, hauled back by hand and dumped on the pipe line already completed, three to five buckets filling the car in 1¼ to 3½ minutes. A wagon required five full buckets and a string of wagons four minutes apart could be kept going with the machine in full and steady operation.

One count of the number of men required showed foreman, engineer, and fireman, trip-boy to unload buckets, 2 men on dump-car, 1 man with bar on side of trench, 2 men handling pipe and 2 men laying pipe, each helping on another's job on occasion. The machine saved a considerable number of men, for in the hard clay and shale almost as many picks as shovels would be required and more length of trench would be open at a time.

This job was reasonably well managed and the contractor was making some money on his price of $7.50 per foot for 48-inch pipe complete, $5.70 for 42-inch and $4.70 for 36-inch. The contract included 5 manholes at $45 and 60 feet of 12-in. catch basin drain at $1.70 per ft. of vitrified pipe. The Keystone machine is well adapted for this kind of work.

The second contract described is for a segment-block sewer, of which there is 1,200 ft. of 60-inch diameter, 18.2 ft. average cut, at $11.05 a foot; 560 ft. of 54-inch, 15.6 ft. average cut, at $8.68; 470 ft. of 48-inch, 14.8 ft. average cut; 576 ft. of 36-inch, 12.6 ft. average cut. In the 54-inch portion observed, the cut was from 15.4 ft. to 15.7 ft., over half of which depth was of hard clay and nearly half was of shale which could be picked but was probably moved more economically by some blasting.

In this case the material was excavated by a grab-bucket which in three or four trials could loosen enough to fill the bucket, which was then emptied into a wagon or a dump-car running on a short track. Wagons carried off the surplus, the dump-car back-filling the trench behind the block-layers. The excavating machine ran on rails laid on each side of the trench directly on the pavement, and could be moved back and forth to handle clay and shale as required. It could swing through about 180 degrees horizontally and 60 degrees vertically.

Apparently the presence of the shale was not considered by the contractor in making his bid. Also his work was not well organized and was going very slowly. Consequently he was losing money.

The machine was doing most of the work, the number of men being a minimum; engineer, fireman, foreman who handled the excavator bucket and the pushing and dumping of the dump-car, 3 pick-men in the bottom, timekeeper, and superintendent. Block layers worked intermittently when bottom was ready for laying sewer.

The program of digging observed was first to take out the clay with the grab-bucket. The shale was then loosened up in a thick layer, partly by men with picks and partly by the machine, a nearly vertical face of the end of the layer allowing the bucket to get under the shale layers, lift and break them off. A second layer was treated in the same way, reaching the bottom of the trench. This shale excavation was narrower than the trench and the sides were picked down to proper width for laying the sewer. The segment-blocks allowed rough and projecting trench sides except for the invert, which was carefully excavated to form and shape. This program was slow, especially with the small number of men employed, and blasting would loosen the material so that it could all be handled by the grab-bucket, except some shaping of sides.

Estimates of cost can be of little value on this job,

which, so far as details were concerned, was a good example of how not to do it, although the general plan, if properly carried out, should produce good results. The original bid was probably too low to make it possible for any one to come out even, but losses could be materially diminished by better management.

The third contract described is for a concrete pipe sewer the major part consisting of 4,660 ft. of 72-inch with average cut of 14.3 ft., and 500 ft. of 60-inch with average cut of 16.2 ft. At the point observed, the cut varied from 12.6 to 13.9 ft. and was in stiff clay, the upper portion being rather dry yellow clay and the lower third of blue clay, which was somewhat wet and occasionally required some draining and pumping.

The excavation of this trench was made by two machines. At the end of the trench was located a Keystone machine, which took out about 8 feet depth of yellow clay. The trench was too wide for this machine to handle completely and only about half its width could be taken out directly. The sides of the trench were picked down by men below, occasionally aided by a man with a bar above, and this loose material was lifted by the bucket with that dug out from the middle of the trench. The hard material required some use of the bucket as an excavator until enough loose material was secured to fill the bucket, when it was lifted and dumped into wagons which carried it off as surplus material.

The other machine was a Thew machine operating a grab-bucket which took out the remainder of the material in the trench and handled the pipe. The machine revolves through a full circle, and a bucket of material brought up in front of it was immediately deposited on the completed sewer behind it, without moving the machine. There was a short track and a dump-car to carry material to complete the back-fill farther back. The trench being practically the width of the outside diameter of the concrete pipe, the sides of the trench were dressed carefully for both machines to let the pipes in. By opening the grab-bucket across the trench, its bottom could be taken out to grade and form with a minimum of dressing of the inverts, a little gravel on bottom and behind the sides being all that was necessary to bring the pipes to exact grade and full bearing.

In eleven working days 240 feet of this 72-inch sewer was laid, an average of nearly 22 feet a day.

The Keystone machine moves itself, running on the pavement in advance of the trench. The asphalt pavement was cut along the edge of the trench and the machine dug up aspalt and concrete foundation which was wasted with the rest of the product of this machine.

The Thew machine runs on 8 by 12-in. stringers, one on each side of the trench, and moves itself forward or back.

The method of handling pipe is of interest. There is no projecting bell on the pipe (the "Jackson" pipe is used), the bells and spigots being formed within the 7 inches thickness of the pipe walls. The pipes, which are made at convenient places along the line of the work, are rolled to the place they are to be laid. A pipe is lifted and lowered into the trench by a saddle made of a channel of a little more than 4 ft. length in which is fitted a block of wood rounded to fit the inner ring of the pipe. Stirrups are inserted in the projecting ends of the channel, into which the hooks of the hoist are inserted. The pipes have wider joint spaces at bottom than at top and if they have not rolled in right side up the saddle is slipped down the side and a slight hoisting turns the pipe until, when it is right side up, the pipe is lifted up and lowered into the trench. Here there is substituted for the saddle a stirrup made of two I-beams fastened together at one end so as to be parallel and far enough apart to hook over the outer end of the pipe and long enough to extend nearly to the inner end. Three stirrups in the upper I-beam give opportunity for lifting in any way convenient to lift the pipe and move the spigot end into the bell end of the pipe previously laid and then adjust the pipe while gravel is tamped under it to give exact grade. The weight of the pipe makes it easy to bring it into full bearing. Pipes are handled from street to position ready for cementing joint in 5 to 10 or 12 minutes each, according to amount of adjustment of position and grade necessary. Grade is tested with a standard sewer pipe-laying gauge measuring down from the stretched line above to the lowest point of the invert, and alignment by a plumb-bob dropped from the same stretched line above. A 6-ft. pipe weighs about 4 tons and has walls 7 in. thick. The price for excavating trench, furnishing and laying this 72-in. pipe and refilling trench complete, ready for the pavement, is $9 a linear foot.

The contract was quite well handled and the contractor seemed to be making a reasonable profit. For 60-in. pipe the price is $7. Brick repaving is paid for at $1 a linear foot of trench, a little more than half being for the 72-in. pipe and the remainder for 24 to 15-in. pipe. Asphalt paving is paid for at $1.25 a linear foot, all being over 72-in. pipe trench.

WIDENING A STREET FOR INCREASED TRAFFIC

Details of Work Done in Indianapolis—Widening Wood Block and Asphalt Roadways Without Relaying Old Pavements—Curbs and Gutters

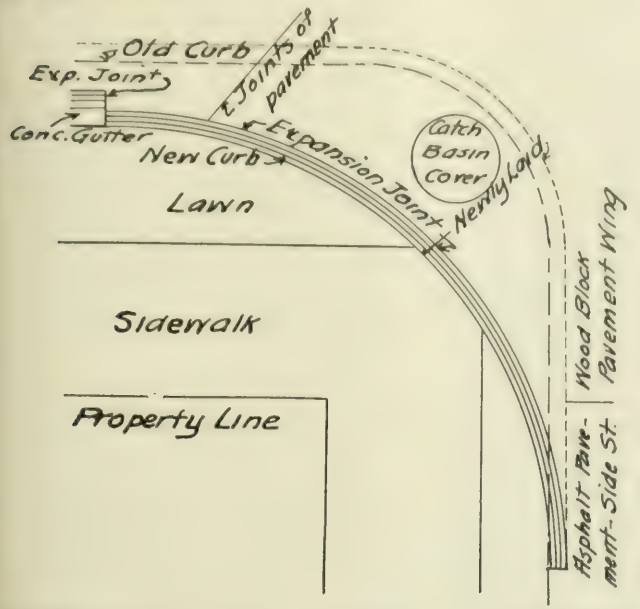
The width of Meridian street in Indianapolis north of Sixteenth street was fixed over twenty-five years ago. South of Sixteenth the street was improved a few years later and was made wider, as wide, in fact, as it could be without destroying the fine trees on both sides of the street. In some cases trees were saved by breaking the curb and surrounding the tree with a concrete curb projecting a short distance into the gutter.

The roadway north of Sixteenth street has become inadequate for the fast-moving traffic of today although two rows of vehicles can stand one at each curb and two vehicles could pass each other between them by going slowly and carefully. After two or three years of effort the street from Sixteenth to Twenty-fifth has been widened three feet on each side. Also a portion of the lower part of the street, from St. Clair to Tenth, is now largely devoted to business and it also has been widened about the same amount. The latter part of the pavement is a comparatively new wood block pavement, and the former part is an asphalt pavement, of various ages.

The first step in the widening was the changing or lowering of the conduits for the boulevard system of lighting and the setting of the new curb. Opportunity was taken to lay the curb with smoothly cut granite and to greatly increase the radius of curves at some of the street intersections. In some cases the old radius of six or eight feet was increased to twenty feet, where the width of sidewalk and the location of drainage channels permitted. At the same time the inlets to catch basins were reset to suit the slightly lower elevation of the gutters and the new positions of the curbs, inlets usually being set back from the curve of the corner. The conduits are under the new gutter.

Where the old pavement is asphalt, the space between it and the new curb is filled with brick laid flat on concrete foundation and with grout filler, the bricks being set with their length parallel to the curb. At alley intersections a gutter is formed of the brick so laid, the

alley wing being otherwise of the old asphalt. Where driveways are made into private property they are of concrete and are run down to the regular brick gutter. The return curves in such cases are made of concrete, connecting the straight granite curb of the street with the flush curb of the driveway where it crosses the cement sidewalk. The width of sidewalk and of lawn varies because the total width of street varies, but is usually sufficient to cause no break in the sidewalk on account of the driveway. Sidewalk and lawn together are from ten to fifteen feet wide, and width of new roadway is about 36 feet.



WIDENING WOOD BLOCK PAVEMENT AND INCREASING RADIUS OF CURB AT CORNER.

Where the old pavement is wood block, the street is wider and the pavement is wider, the widened pavement being about 42 feet. The expansion joint along the curb consists of four rows of blocks laid longitudinally with bitumen-filled joints. After the new curb was set, a concrete gutter was laid, 12 inches wide. The longitudinally laid wood blocks were taken up and cleaned, so far as they could be, and were good enough to be used again. They were relaid, using a considerable proportion of new blocks, and the two feet or so of space remaining was covered by carrying out the diagonal rows of the old pavement with new blocks until they were fitted to the side of the longitudinal rows.

Practically no patching of the asphalt was necessary, since the new space was filled with brick and the grout filler, and a few days' use removed all trace of the process of widening. The junction of new blocks with old in the wood block pavement is so well done that a few weeks of use will probably do the same for that portion of the work.

Several streets in Indianapolis have been widened to meet the increased demands of traffic or of the change from residence to business conditions. This seems to have been the widening easiest to make, due no doubt to the excellence of the method adopted. The problem arises frequently in the design of new streets where the future course of development is unknown, and the ease with which this widening was done suggests that the original design can be so made that if widening is ever necessary it can be done as in this case by extending the pavement either with the same material or with different material. The greatest expense is in the revision of the curb lines, and there is room for a design for a curb which can be used on such doubtful streets and reduce the cost of change if one becomes necessary.

HOLLAND WATER DEPARTMENT SELF-SUPPORTING.

Commencing with the fiscal year, 1917-18, the Water Department of Holland, Mich., has been self-supporting, as is the Light Department of that city. This is the result of the approval by common council, on February 21st, of the recommendation of the Board of Public Works that the city pay the Water Department for hydrant service or public fire protection, that department in turn to pay interest on outstanding indebtedness and the taxes that a private plant would pay, neither of which it has paid in the past.

The report for the fiscal year ending March 19th, 1917, shows credits and debits based upon hydrant service and interest and taxes, but merely as a matter of bookkeeping. In this account hydrant service is credited with $10,859.48, this amount having been arrived at by assuming a rate of $35 per hydrant per year. The department also charged itself with $1,859.60 taxes, and $2,437.50 interest on outstanding indebtedness; the sum charged as taxes being found by applying the rate of $11.77 against the value of the plant. The difference between the interest and taxes and the hydrant service was $6,562.32, which was the net amount owed by the city for hydrant service. On the other hand, however, $8,000 was turned over to the water fund from the general tax levy. The difference, or $1,437.38 is the net assistance given the department by the tax-payers.

In making out the annual statements for this plant, depreciation is calculated upon the following basis: Land, nothing; pumping stations, buildings and grounds, 2 per cent; boiler plant, buildings and grounds, 4 per cent; stand pipe and reservoir, fixtures and grounds, 3 per cent; pumping station equipment, at one station 4 per cent, and at two other stations, 5 per cent; boiler plant equipment, 5 per cent; wells, 6 per cent; general office equipment, 6 per cent: stores, department buildings, fixtures and grounds, 2 per cent; stores department equipment, 6 per cent; distributing mains, 2 per cent; hydrants, 2½ per cent; services, 2 per cent; meters, 5 per cent. The total investment at the close of the fiscal year amounted to $238,660.84, the depreciation during the year was calculated to be $5,671.76, and the value at the close of the year, $158,017.56.

The department calculated that the total operating revenue, including the amounts credited for hydrant and sprinkling service, was $37,613, the hydrant and sprinkling service being valued at 30 per cent of the total operating revenue. The operating expenses amounted to $14,709. To this was added the estimated depreciation (presumably in lieu of sinking fund) and the taxes brought the total up to $21,625, and this and the interest on outstanding indebtedness deducted from the total operating revenue left a net income of $13,694. Of this, $8,300 was used in redeeming bonds. The operating expenses plus taxes, interest and depreciation increased at a more or less uniform rate up to the year 1914, which marked a maximum, since which the operating expenses have fallen off nearly $4,000. The total operating revenue also has been increasing.

The population of Holland is about 12,000, of which about 21 per cent are consumers. The investment per 100 gallons capacity is $3.18; the total operating revenue per 1,000 gallons capacity was $5.01; the total operating revenue was $3.13; the net income per $100 invested was $5.73. The meter rates ranged from 10c per 100 cu. ft. maximum to a minimum of 4c for all over 300,000 cu. ft. used semi-annually. The minimum charged for six months ranges from $3.00 for a ⅝-inch meter to $70 for a six-inch meter. Ten per cent is allowed on all of the above for prompt payment.

The WEEK'S NEWS

Iowa Counties to Buy Cooperatively—The State Roads of Pennsylvania and New Jersey—Pennsylvania Health Board's Sanitary Crusade—The Waterworks of Akron and Oshkosh—Street Lighting Contracts in Wilkes-Barre and Menasha, Wis.—Restrain Utilites Commission from Reducing Rates—Making the Cantonment Cities Safe for Morality—Better Working Conditions for Boston Firemen—Anti-Litter Work in New York Successful—Evansville Buys a Coal Mine—The Weights and Measures Bureau of New York Stops Fraud.

ROADS AND PAVEMENTS

Co-operative Buying for County Highways.

Des Moines, Ia.—Thomas H. MacDonald, chief engineer of the state highway department, has offered to the county supervisors a solution of the problem of high prices and delayed deliveries of road materials next year. Much of the difficulty is attributed to the small quantities which each county buys and Mr. MacDonald's suggestion is that the supervisors' association appoint an executive committee of eleven members to buy co-operatively for all the counties in the state. Materials upon which the executive committee would receive lowest bids in large quantities would be lumber, reinforcing steel, cement, sand and gravel, but mainly the first three as their supply is far removed from the state. Under the proposed plan, counties would file their estimates early this fall for next year's needs. Then the committee for the state would procure the lowest possible estimates for lumber, steel and cement, in large quantities. The price thus obtained would be submitted to the individual boards, whose members could accept or reject them. Contracts for lumber and reinforcing steel, the engineer says, taken months ago, are in many instances still unfilled.

Freeing Toll Roads in Pennsylvania.

Harrisburg, Pa.—Since the state began in earnest, six years ago, to free the roads of tollgates, 197.07 miles of toll roads have been freed by the state and the local authorities. The state highway department believes that public sentiment has now reached a point where it is justified in going right ahead with the work of freeing every toll road in the commonwealth. Within a month 41.5 additional miles will be freed by the department, making the total mileage freed from the beginning of the campaign 233.57, or thirty-four per cent. of the total number of miles found under the old tollgate system in 1909. In summing up the present status of the department's work, commissioner Black pointed out that the appropriations that have been made to the department to be expended specially in the acquisition of toll roads has amounted to less than $1,000,000. These appropriations are: 1913, $100,000; 1915, $250,000; 1915 (deficiency), $24,000; 1917, $500,000. Pennsylvania's present total mileage of toll roads is 524.93. Of this mileage 394.58 is located on state highway routes. The state department has no authority to take over toll roads which are not located on state highway routes. Where roads for which tolls are charged are otherwise located the commissioners of the county in which such roads may be located may proceed by purchase or condemnation to take over toll roads, or any body of citizens desiring their abolition may institute proceedings for the condemnation of the road, in which case the county pays the price which may be fixed on the highway. The 1917 legislature passed an act which authorizes counties, townships, boroughs or incorporated towns in which toll roads are located on state highway routes to contribute such portion of the purchase price, or of the cost of condemnation proceedings, as may be agreed upon with the state highway commissioner. All of the counties in which toll roads are located on state highway routes have agreed to co-operate with commissioner Black on a fifty-fifty basis in freeing the county of toll roads. Berks, Lebanon and Dauphin Counties each will pay its proportionate share of the cost of the Berks-Dauphin turnpike, which will be taken over by the state department about September 1 at a cost of $70,000. The share to be borne by each county will be in proportion to the mileage of turnpike within the county's limits. Lancaster county now is conducting an aggressive campaign in an effort to abolish toll roads. Proceedings are under way in the courts of Delaware county for the condemnation of the Philadelphia and West Chester turnpike, which is eight and one-half miles in length. In Mifflin county proceedings have been instituted for the condemnation of the Lewistown and Kishacoquillas turnpike, which is 5.5 miles long. Westmoreland county has agreed to pay one-half of the cost of freeing the Donegal-Mount Pleasant township turnpike, and negotiations are nearing completion for its purchase at a cost of $10,000. With the passing of tolls on this turnpike, all highways in Pennsylvania west of the Allegheny Mountains will be free for public travel.

Plan Continuity of New Jersey Roads.

Trenton, N. J.—Declaring that the continuity of improved main highway routes is broken by the absence of connecting links through many towns, boroughs and cities, the state highway commission has appointed a special committee to investigate the subject and report at the next regular meeting. The committee is composed of former road commissioner Edwin A. Stevens and George E. Blakeslee of Jersey City. The resolution adopted sets forth that the continuation or connecting links of main highways are in deplorable condition in many municipalities. It will be the function of the committee to make specific recommendations as to some form of procedure that may be taken, either through the counties or directly with the lesser municipalities, looking toward the immediate construction of such connecting links as are needed to make continuous improved highways. Gen. Geo. W. Goethals was present at the meeting and received assignment of duties as chief engineer. He has submitted to the highway commission a report on the progress of the surveys being made under his direction for the new state road system. He shows that very considerable progress is being made on these surveys, but the work is hampered because not enough men can be obtained for laying out the roads. At present about fifty surveyors are engaged on the work. "In view of the fact that this department has been unable to get sufficient men for survey as rapidly as desired," he says, "it has been decided to change the methods, and to resort to reconaissance surveys for the larger parts of the routes. It is intended to complete the survey of routes Nos. 3 and 6 with the view of using the complete information of these two routes which will be typical of practically all the routes in South Jersey, as data for the other routes. All data available will be secured in order to get as close a cost of the system as possible." Route No. 3 extends from Camden to Atlantic City. On this route, General Goethals reports that a continuous alignment survey has been made of the entire length. Route No. 6 extends from Camden to Bridgeton and Salem. Starting at the southerly end, the survey has proceeded northwardly about 10 miles, and General Goethals says it should be completed the coming month. Cross sections of Route No. 3 have been completed for a distance of five miles from Absecon, and the profiles have been finished for the same distance. The mapping of this route has been completed for 3 miles. On Route No. 4 the survey has proceeded from Absecon, and the profiles have been finished for the same distance. The mapping of this route has been completed for 33 miles. On Route No. 4 the survey has proceeded from Absecon 12 miles north, the mapping being carried along with the field work. One of the interesting comments in the report is to the effect that the notorious

"hole in the wall" in South Amboy will be avoided, if possible, in the construction of Route No. 4. This route will extend from Rahway, where it will branch off of the route from Elizabeth to Trenton, to Perth Amboy, Red Bank, Asbury Park, Lakewood and Absecon. The "hole in the wall" is a tunnel under the tracks of the Pennsylvania Railroad in South Amboy, and it is so narrow that two vehicles cannot pass each other. It is a very dangerous spot, and for many years there has been waged an unsuccessful fight to eliminate it. Meanwhile mandatory orders have been sent out to the county tax boards by Frank D. Schroth, secretary of the state board of taxes and assessments, directing them to assess the tax of one mill on each dollar of real and personal property each year for five years for the road scheme. Some of the cities are continuing their plans to fight the tax. "This means," said commissioner J. Hosey Osborn, director of finance of Passaic, "that every atom of home rule has been taken away from us in this matter. Our tax rate is to go up about ten points for this contribution of $50,000 which has been levied upon us against our will and against our protest, and we are not even given a chance to fight. We had intended, if possible, to avoid this issue until another legislature had had opportunity at least to make the arrangement fairer to our communities. Therefore we had not included this $50,000 in the levy. Now we must raise the money. That's clear, under the order from Trenton. But whether or not we'll pay out the money is another question. Although the law requires us to pay over this $50,000 to the county collector out of the first moneys, on or before December 22 next, I certainly shall not pay it out until and unless every atom of doubt about the matter is cleared away." The cities want an injunction restraining the operation of the roads bill until the next session of the legislature.

SEWERAGE AND SANITATION

State Board Cleans Up Pennsylvania Boroughs.

Gettysburg, Pa.—State health commissioner Dixon, who is cleaning up the boroughs of the state whose boards of health are lax, took charge of the sanitary affairs of Gettysburg, where there are 7,000 to 8,000 regular army men encamped. In placing his own men in the borough commissioner Dixon made it clear that the board of health is not alone to blame, but the Borough Council, which has refused to furnish funds or ordinances for the board so that a general clean-up of very filthy conditions might be accomplished. A few weeks ago Dixon gave the local board of health two weeks in which to clean up the community. The members of council openly opposed the sanitary measures asked for, and several of them appeared at a mass-meeting to oppose suggested plans for cleaning up the fifty or so "piggeries" that are maintained within the borough's confines. The two principal troubles in the borough were found to be the filthy piggeries and the surface outhouses. The flies and mosquitoes were unusually numerous, due to the general insanitary conditions. The state tuberculosis dispensary was made the headquarters of the staff of Dr. Dixon's men. Chief medical inspector B. Franklin Royer, of Harrisburg, was put in charge. Five assistant engineers of the department tested water, and five special inspectors were sent to the borough. Edward Stewart, chief of the bureau of public service of the department of health, inspected hotels and restaurants. One restaurant was closed by Dr. Dixon a week ago. Five hundred sources of water supply were tested outside the borough, and 75 per cent of these were found polluted. These polluted springs and wells have been placarded. Colonel Nicholson, in charge of the battlefield, notified some of the assistant engineers that if they placarded any of the battlefield springs he would call the park police. The state health department obtained an opinion from the attorney general's department that the state has jurisdiction on the battleground. The sanitary cleanup is made not only for the army, but for the people of Gettysburg as well.

Eddystone, Pa.—Following investigation of insanitary conditions prevailing in Eddystone by health officer Thomas W. McCombs and Charles O. Struse, of the State Bureau of Housing, commissioner of health Dixon ordered the dismissal of the entire board of health of the borough. The deposed board was made up of Dr. A. D. Ferguson, James Atkinson, George W. Moore, Herman York, Walter Bryan and Charles Adams. Alfred Heisner was the health officer. That few inspections have been made of the twenty-five restaurants in the borough was admitted by the members. The law requires all employees to be examined twice a year, at which time he is presented with a certificate by the examiner, and the stub taken to the board of health to be filled out, certifying the employee has complied with the regulations. Few stubs were found. Eddystone has a settled population of about 7,000 inhabitants, but during the day is host to an army of nearly 25,000 workmen. To feed this army all kinds of eating houses have been opened, ranging from curbstone establishments to respectable hotels. Little care has been exercised in the selection of employees, and in some places it is charged that no attention has been paid to the quality of the food. Decomposed meats and vegetables and fly-ridden cakes, pies and bread are displayed for sale in some of the shops, but no official cognizance was taken of the irregularities. Employees suffering from skin disease and otherwise unfit for their positions, it is declared, handled the food in some of the restaurants. Friction between the borough council and the board of health increased the inaction of the latter body. Several weeks ago the health board purchased some signs giving notice of penalties for spitting on the sidewalk. The borough refused to pay for these, and the signs now repose in the firehouse. Residents charge the health officer ignored the presence of dead dogs, cats and other animals. Ash piles and garbage heaps close by dwellings, offensive in hot weather, also passed unnoticed they declare. Boarding houses, which include almost every dwelling in the borough, pack four to eight men in a room in certain instances, it is charge by residents, creating extreme unsanitary conditions. D. J. William Wood, of Chester, member of the county health board, and state officer Thomas McCombs, of this city, were put in charge of the health work. A stringent inspection was made, and all infractions met with severe penalties. The borough may be annexed to Chester.

Chester, Pa.—After the Eddystone cleanup, Dr. Dixon turned his attention to this city. In a letter to Benjamin D. Wright, superintendent of public safety, Dr. Dixon called the local officials to task specifying insanitary back alleys and standing water in many sections. Backyard wells and the lack of proper drainage systems are conditions which have met the disapproval of the health chief. It is reported that deputies from Dr. Dixon's office in Harrisburg have been working quietly in this city for the last few weeks, and have obtained much evidence that points to a careless administration of health department affairs. Dr. W. Knowles Evans, director of the department of health in this city, is at a military camp, and since his departure several weeks ago no successor has been named.

Industrial Hygiene Bureau for City.

Toledo, O.—The Toledo health department, under the direction of Dr. C. D. Selby, has established a new bureau of industrial hygiene in connection with the city health division in charge of Dr. Paul M. Holmes, of Columbus, formerly assistant physician in the Division of Industrial Hygiene of the Ohio State Department of Health. Dr. Holmes was selected by the trustees of Toledo University upon recommendation of Dr. Selby. He will make a survey of Toledo industrial concerns and cooperate with employers in the elimination of health hazards in industries. Toledo recently employed a public health instructor through whose activities the health division is gaining much valuable publicity.

Typhoid in Camp and Village.

Pompton Lakes, N. J.—The spread of typhoid fever through the camp of the Fifth New Jersey Infantry at Pompton Lakes, and in the village, was caused through the contamination of the drinking water and resulted in a score of cases and one death among the soldiers and villagers. Two tests were made by officials of the state board of health, Pompton Lakes board of health and Major Frank Y. Neer, of the Hospital Corps. One of the sources of contamination was found in an overflowing cesspool located

near the pumping station of the borough water supply system. The overflow of the cesspool leaked into the well. Aniline dye placed in the outhouse is said to have appeared in Well No. 1 within three minutes. The explanation was that it had seeped through a tile cracked in the du Pont explosion in January. The Pompton Lakes water comes from two wells. For the local board of health, S. H. B. Jacobs, a member of that body, who is also a member of the borough water committee in charge of the pumping station, said: "I refute absolutely the charge that conditions at the pumping station are responsible for the epidemic. It may be a contributory cause." Borough officials said that pollution probably occurred because of the proximity of the regimental latrines to the pumping station. They stand almost on the line of the water plant tract. A heavy rain that occurred July 22 could, it is claimed, have spread the seepage area of the latrines, and it is said to be significant that the outbreak appeared just fourteen days after that date, the exact period of incubation.

WATER SUPPLY

Expansion for Waterworks.

Akron, O.—Work is soon to begin on the extension of the city's water supply system to make it adequate for a population of 175,000. Cast iron pipe, filtration plant extension, pumping station and standpipe and valves and gates contracts have been let, $500,000 being spent on them. G. G. Dixon, waterworks engineer, said that the new pipe lines would help to relieve conditions all over the city. Laying the pipes will be started at once, and it is expected that the work will be completed before winter. New sand filters will be added to the present battery in the water pumping station near Kent, which will be capable of taking care of an additional 10,000,000 gallons daily. In order to give West Hill as good service as any other part of the city, a boosting station and a storage standpipe or tank will be placed at Sherbondy Hill. Some of this work is expected to be done by fall, but it will probably not be complete until spring. Contracts were let this spring for the enlargement of the Kent pumping station by the addition of a 10,000,000 high lift or 25,000,000 gallon low lift pump, and a steam power plant. The boilers must be installed by Oct. 6, 1917, and the pump by July 20, 1918. Already there are two pumps in the station, one with a capacity of 10,000,000 gallons, and the other 15,000,000 gallons. In the future the regular capacity of the plant will be 25,000,000 or 30,000,000 gallons daily, with one pump lying idle in case of a breakdown.

The West Virginia Water Supply Tests.

Charleston, W. V.—Mayo Tolman, engineer of the public service commission, has sent the following letter to Mayor J. Loyal Gilbert, of Parkersburg. The commission's report on the water supplies of 117 municipalities in the state had charged that many are unsafe and a decided protest from many cities followed its publication. The letter says: "No one can deprecate more than I the newspaper articles that have appeared as a result of this report. The inspectors averaged the results of all water samples from each town regardless of the source of these samples, and it was these averages that they gave to the newspapers. In other words the results represent a combination of tap samples and samples directly out of the Ohio River, and have no value whatsoever. I have gone over the results and find that instead of Parkersburg's water supply being unsafe 70 per cent of the time, as their results indicate, 16 per cent of the tap samples only have been unsafe and 16 per cent suspicious, making 32 per cent of the samples not up to standard. Some of the bad results are probably due to the length of time elapsing between the collection of the samples and their delivery by the express company at the hygienic laboratory at Morgantown. However, unfortunately, I do not find that the Parkersburg samples show quite as good results as Huntington and a few other towns who experienced the same long delays because of the express company. I would suggest that you can insure a water supply with a uniformly low bacterial content by increasing the dose of chlorine gas somewhat above the figure you are using at present. If I were you I would never permit your dose to be less than 3-10ths of a part of available chlorine in a million gallons of water, and it might be found wise to use as much as 35-100ths of a part. On the whole, Parkersburg has a very excellent water supply, and I think you have no cause to let the article which appeared in the newspapers occasion the slightest worry. Of course, I realize it is not pleasant to have a water supply put down as unsafe when you know it to be perfectly wholesome. Your city, however, has not suffered because of these articles as has the health department. According to the report as issued by the inspectors of the public service commission, after two years of effort the state department of health has secured but seven safe drinking water supplies out of 117 examined, which would show us to be a very inefficient body. As a matter of fact the very results which the inspectors used show that 60 per cent of West Virginia's drinking water supplies are probably safe for consumption."

New Filtration Plant Completed.

Oshkosh, Wis.—The new municipal filtration plant is about completed, according to T. B. Jorgensen, resident engineer in charge of construction, and as far as the structure is concerned the only thing left is the erection of interior fixtures (plumbing and electrical) and finishing touches on the several concrete basins, which are water-proofed on the inside after being thoroughly cleaned out to receive water for tests. The plant will be opened in about two months. "We have experienced considerable delay, which is no fault of any local contractor who has had anything to do with the structure," said Mr. Jorgensen. "The delay has been caused by the unreasonable time required in obtaining castings and equipment by the contractor for the appliances and accessories. The plant will accommodate six million gallons a day, and has six filter-beds each of a capacity of one million gallons. This plant is also provided, Mr. Jorgensen states, with a new aerating equipment of Col. Henry A. Allen's patent. The operating gallery, which is located on the first floor of the brick building, is in the center of the building between the filter-beds, three on each side. This gallery floor is covered with red tile, and there is a white glazed brick railing on each side of the gallery. Each filter-bed is controlled from a movable operating table located on the operating gallery. On the second floor of the brick building is located the laboratory, where the water will be analyzed every day and the application of chemicals will be adjusted as required by the water tests. The brick tower incloses a 50,000-gallon steel tank for water for the purpose of washing the sand in the filter-beds about once in twenty-four hours. This tower is also going to serve as a smokestack for a future pumping station, as a steel stack will be erected inside of tower and discharge through the brick stack in the roof, about 120 feet over the ground level. This design does away with the disfiguring feature of an ugly smokestack, and also eliminates additional expense. The water will be brought to the plant through two twenty-four-inch cast iron intake pipes. One of these connects into the old intake, and the other, which is now being placed, goes out into the lake 1,200 feet. The outer end of this is connected to a submerged concrete crib. The second intake pipe, which is going to be connected to the old intake, is already placed, with the exception of the connecting castings, which have been considerably delayed in their arrival.

STREET LIGHTING AND POWER

Commission Restrained from Rate Reduction.

Washington, D. C.—Justice Gould of the district supreme court has granted the application of the Potomac Electric Power company for a temporary injunction against the public utilities commission to prevent the enforcement of its order to reduce the price of electric current from 10 cents to 8 cents per kilowatt hour. The order of the court will restrain the commission pending final determination of the litigation. In order to protect the 30,000 consumers of electricity and to insure the return to them of the 20 per cent excess over the new rate adopted by the commission, justice Gould made it a condition of granting the injunction that the Potomac Electric Power company furnish security for the repayment to the consumer in the event that

the United States supreme court should finally uphold the rates adopted by the commission. The court also exacted from the power company the payment of interest at 6 per cent on the excess paid by the consumers. Justice Gould ruled against the contention of corporation counsel Syme that paragraph 63 of the utilities act takes away the injunctive powers of the court to restrain rates fixed by the commission. Such a construction as contended for by Mr. Syme, the court said, might "result in confiscation of the property of a public utility before a final decree could be obtained from the court of last resort. To deprive any person or corporation," said the court, "of the right to invoke the jurisdiction of equity to prevent such result would be simply taking property without due process of law." The court suggested that the paragraph was intended merely to put the burden of proof upon one assailing any order of the commission to show the unreasonableness of such order. After reviewing the bill and answer and the differences in valuations claimed, justice Gould pointed out that if the new rate should be held unreasonable by the United States supreme court and no temporary injunction had been issued preserving the status quo, the plaintiff would have been compelled to receive, during the pendency of the litigation, $350,000 less per annum than it would receive under its present contract rates with its consumers; and its only remedy would be to bring 30,000 separate suits against the individual consumers for 20 per cent of the present contract rate. In a very great number of cases the individual indebtedness would be so small as not to warrant filing suit, the court suggested; and death, bankruptcy, removal and other causes might entirely defeat recovery. On the other hand, should the commission's rate be upheld the conditions of the temporary injunction would secure to the consumer the return of any excess payments and little or no injury be inflicted.

Competitive Bidding Cuts Street Lighting Rates.

Wilkes-Barre, Pa.—Following a decision by the state superior court, denying a supersedeas to restrain competition approved by the public service commission, the Wilkes-Barre company was outbid on a contract to light the streets by the Wilkes-Barre Light Company, a new concern. The week before, the Welsbach company, which had had the contract for gas lighting for several years, was outbid by the Carroll company, recently organized by local citizens. Since the latter has no plant it is expected that the Welsbach company will be forced to sell its product to the new company. The contract with the Carroll company is estimated to save the city about $16,000 in five years. According to the bids of the Welsbach company and the Carroll company, the difference in bids for one year under the five year proposal is $3,070.35, the Carroll company bidding $14,768 for each year for lighting 341 gas lamps and the 174 naphtha standards, while the company that held the lighting contract here for the past seventeen years bid $17,838.35 for the same work.

The Carrol company's bid was as follows: For a one-year term—Lighting 341 gas lamps at $30 per lamp per year; 174 naphtha lamps at $32 per lamp per year. For a three-year term—Lighting 341 gas lamps at $29 per lamp per year; 174 naphtha lamps at $31 per lamp per year. For a five-year term—Lighting 341 gas lamps at $28 per lamp per year; 174 naphtha lamps at $30 per lamp per year.

The bid of the Welsbach Street Lighting Company of America was as follows: For a one-year term—Lighting 341 gas lamps at $30.60 per lamp per year; 174 naphtha lamps at $39 per lamp per year. For a three-year term—Lighting 341 lamps at $29.60 per lamp per year; 174 naphtha lamps at $45 per lamp per year. For a five-year term—Lighting 341 gas lamps at $29.35 per lamp per year; 174 naphtha lamps at $45 per lamp per year.

In the case of electric lighting, bids were received for three, five and seven-year periods. In lighting the city hall, police station, fire houses and other municipal buildings the two competing companies submitted the same bid.

The bidding was as follows: 400 candle power, 15 ampere, Type C Mazda lamps, inclosed in a good street service pendant fixture equipped with light diffusing globe and reflector yielding not less than 280 candle power. Wilkes-Barre company—For three years, $62 per lamp, per year; for five years, $54; for seven years, $50. Wilkes-Barre (New) Light Company—For three years, $42.50; for five years, $42; for seven years, $41.

600 candle, 20 ampere, Type C Mazda lamps, inclosed in a good street service pendant fixture equipped with light diffusing globe and reflector. Wilkes-Barre company—For three years, $65 per lamp per year; for five years, $58; for seven years, $54. Wilkes-Barre Light Company—For three years, $43.50; for five years, $45; for seven years, $47.

Alternating series inclosed arc lamps to consume not less than 4½ amperes of current at 72 volts. Wilkes-Barre company—For three years, $70; for five years, $62; for seven years, $57. Wilkes-Barre Light Company—For three years, $50; for five years, $49.75; for seven years, $49.50.

For furnishing light for police station, engine houses and all municipal building, both the old and the new companies submitted the same bids, that of 2½ cents per kilowatt.

For lighting and maintaining forty-two lamp standards equipped with five lights, each having four lamps of 60 watts each and one lamp of 100 watts, the Wilkes-Barre company bid as follows: For a three year term, $47; for five years, $46; for seven years, $45; the Wilkes-Barre Light Company bid: For three years, $39; for five years, $39.50; for seven years, $40.

For lighting Public Square standards of five lamps each of 100 watt Mazda the Wilkes-Barre company bid as follows: For three years, $37; for five years, $35; for seven years, $35. Wilkes-Barre Light Company, for three years, $35; for five years $34.50; for seven years, $34. These quotations are on the basis of the city maintaining the standards.

The awarded contracts mark the end of a long fight. About a year ago it was awarded to the old company in spite of its high bid. A petition of 4,000 tax payers of the city failed to prompt the county courts to force the city commissioners to an initiative or referendum. The highest state court was appealed to and an opinion rendered, forcing a mandamus through the lower courts upon the city officials to either rescind the contract entered with the Wilkes-Barre (old) company or submit the question to the voters at a special election. The first alternative was taken, the contract rescinded and bids again asked for. As a year ago, the new company outbid its competitor.

Lighting Contract Agreement After Long Fight.

Menasha, Wis.—Final steps in the well-known Menasha lighting case were taken when the mayor and city clerk were directed by council to enter into a contract with the Wisconsin Traction, Light, Heat & Power Company for a period of ten years with provision for the renewal of the contract for an additional period of ten years, providing that the municipal lighting plant of the city of Menasha be opened and operated for the purpose of furnishing electric current for light, heat and power within the city of Menasha, the capacity of the plant to be limited to five hundred kilowatts. It is further provided that the city of Menasha shall not furnish electric current to any user other than the city itself whose initial demand for current shall exceed ten horsepower and the city not to furnish any current to any user except itself, whose demand for current shall have increased to exceed twelve and one-half horsepower. All proceedings now pending before the railroad commission are to be discontinued and the city will make application to the commission for a certificate of convenience and necessity for the operation of the city plant.

FIRE AND POLICE

Moral Cleanup for Camp Cities.

Washington, D. C.—Secretary of War Baker has sent the following letter to mayors of all cities and towns in the neighborhood of National Army cantonments and National Guard camps and to the sheriffs of all counties in which or near which these camps or cantonments are located: "In anticipation of the military training camp soon to be opened in your neighborhood I am sending herewith a copy of the regulations recently issued on the question of the suppression of prostitution and the sale of alcohol to soldiers in uniform within a given radius of military posts and camps. These regulations, which are based on sections 12 and 13 of the recent Army law, do not, I believe, need comment, and I am confident that their enforcement will help create a wholesome environment about the military camps. There are one or two matters, however, in connection with the enforcement of the regulations to which I would like to call your attention. The regulations do not in any way lessen the necessity of police vigilance on the part of local authorities. The presence of large bodies of troops rather increases the responsibility of those whose duty it is to preserve local order, and I am confident that the War Department can rely on you to the utmost to see that the regulations are rigidly enforced. In the second place, while we have fixed a 5-mile radius about the camp in

which prostitution is strictly to be put down, the War Department will not tolerate evil resorts of any kind within easy reach of the camp, even though such resorts lie without the 5-mile zone. If places of bad repute spring up outside the 5-mile limit, but fairly accessible to the camp, I shall not hesitate to insist upon their elimination. Of course, it would be possible to extend the zone, and I shall not evade the responsibility in case of necessity. At the same time, if the zone is drawn with too large a radius there is danger that the number of soldiers required to police it will be beyond the ability of the commanding officer readily to furnish. In such a case, therefore, it might be easier and cheaper to move the camp to a more desirable locality; provided, of course, that clean conditions could not be secured through any other course. Finally, let me say that the War Department will not tolerate the existence of any restricted district within an effective radius of the camp. Experience has proved that such districts in the vicinity of army camps, no matter how conducted, are inevitably attended by unhappy consequences. The only practical policy which presents itself in relation to this problem is the policy of absolute repression, and I am confident that in taking this course the War Department has placed itself in line with the best thought and practice which modern police experience has developed. This policy involves, of course, constant vigilance on the part of the police, not only in eliminating regular houses of prostitution, but in checking the more or less clandestine class that walks the streets and is apt to frequent lodging houses and hotels. I have appointed a commission on training camp activities to advise with me on matters of this kind, and through this commission I shall keep constantly in touch with conditions about all our Army camps. If you have any questions relating to the enforcement of the inclosed regulations I trust you will not hesitate to get in touch with me or with Mr. Raymond B. Fosdick, chairman of the commission.

Des Moines, Ia.—The orders of secretary Baker have been effective in starting a thorough clean-up of disorderly women and bootleggers. Mayor MacVicar, who is himself an army officer, has returned from camp under special permission to finish up the crusade against vice. Mayor MacVicar has accused the police force of being not only derelict in performing its duties, but of containing disreputable characters. Superintendent of public safety Ben Woolgar and chief of police C. C. Jackson deny the charges and oppose the mayor's plans. The mayor gave out a list of disorderly houses. Many women have been fined and much liquor seized in raids.

Battle Creek, Mich.—Prosecuting attorney Adrian F. Cooper and his assistant, James Cleary, have been busy in a clean-up campaign to clear the city of some of its roughest elements before the men in the first draft come to Camp Custer. A free-lance squad worked for several evenings visiting disorderly houses and bringing captives to the jail. Many women were arraigned. Several negroes were arrested. The arrests will not end the clean-up campaign and condemnation proceedings will be started to do away with the property which is being used for immoral purposes.

Plattsburg, N. Y.—A visit by lieutenant-colonel Paul A Wolf, U. S. A., commanding the training camp officers' reserve corps, at the office of mayor Mooers resulted as follows: Chief of police was reduced and a new chief appointed. Nine saloons and one dance hall were closed. A licensing system for dance halls was effected, putting all under close supervision. Secret service men and welfare workers had been investigating Plattsburg and found conditions they demanded be removed.

Montgomery, Ala.—"If the people of this city do not support the effort of the attorney general to close up the houses of ill fame, we shall take pleasure in assisting to have the army camp moved from Montgomery." This was the declaration of assistant attorney-general Lawrence E. Brown made in chancery court during the hearing of injunction proceedings brought by the attorney-general against twenty-six women as alleged keepers of houses of ill fame, which cases were being tried en masse before judge Gaston Gunter on writs of demurrer and motions to dissolve the injunctions as brought by attorneys of the defendants several days after the injunctions had been granted temporarily. Judge C. P. McIntyre, counsel for the defendants, in a smoothly satirical reply, called the statement of the assistant attorney-general "poppy-cock" and said that if a decision was rendered in favor of the defendants he did not believe that the attorney-general and the assistant attorney-general would get on the train and go to Washington and ask secretary Baker to move the camp from Montgomery. Mr. McIntyre said that it was presumptuous for the attorney-general to bring these injunctions when there were United States officers to bring them and close the houses if they desired to do so. He characterized the action of the attorney-general in branding the women as keepers of houses of ill fame through an injunction with authority and without affidavit, as "infamous." Mayor Robinson has replied to secretary Baker explaining the peculiar operation of the law enforcing department of this city. He tells the war secretary that the police department is absolutely controlled by the board of safety, but that the city's commissioners try to punish offenders that are arrested by the police. He declares that the city commissioners wish to co-operate in every way in suppressing immoral conditions. He draws attention to the fact that the police jurisdiction extends only three miles beyond the city limits and that the police can make no arrests beyond that limit. He expressed confidence, however, that the county authorities would co-operate.

Hattiesburg, Miss.—The "red light" district which has flourished for twenty years in open violation of the laws of the state of Mississippi, but unhindered by either state, county or city authorities, has been wiped out after secretary Baker's orders. Some weeks ago chief Bennett and his men notified all the women in "the jungles" that Baker's orders were there should be no "district" in Forrest county. Most of the women left the city. Others may remain as long as they please, but policemen will be stationed near their houses to see that no men enter. For some months now there have been but three houses of ill-fame in operation. Before the panic of 1907 there were probably a dozen.

Terre Haute, Ind.—When colonel E. M. Lewis and the army officers were inspecting sites for camps and visited this city, at a banquet, three hundred representative citizens stood up and gave their pledge that they would regulate the saloons and wipe out the "red light" district. They are now keeping their promise, despite opposition of the mayor and other city officials. William Horsley, prosecuting attorney, has been forced to take stringent measures. He has given out a list of disorderly houses and the names of their owners. The co-called abatement law of the state is to be enforced against these property owners. Acting mayor Charles Mancourt gave orders to clear the city and all houses appear to have been closed. Most women have left. The disorderly district here was one of the worst in the country.

"One-Day-in-Three" for Boston Firemen.

Boston, Mass.—Beginning Feb. 1, next year, members of the Boston fire department will work only two days out of three, as against four days out of five as at present. An amendment to the city ordinances has been passed by the city council by a vote of 6 to 3. For more than a year the firemen and their friends have attempted to secure passage of this so-called "one-day-in-three" ordinance. Last year, and again this summer, public hearings were held. Councilor Hagan declared that certain of the six men voting in favor of the ordinance were acting through fear that votes of the Russell club and of the firemen in general would be used against them. "I know that they are a weight and a power," he declared. "I knew it a year ago, when I voted against this ordinance and when I was told that I was blacklisted by them and that my personal business would suffer, and I know it now. I have no fear of the Russell club, which the fire commissioner has called an insidious organization within the department, and which is causing trouble, insubordination, chaos and inefficiency." President Storrow made a motion to defer action on the ordinance

until 60 days after the close of the war. He quoted commissioner Grady's statement that at least 192 men must be added when the ordinance goes into effect

GOVERNMENT AND FINANCE

Public Service Commission Will Help City.

New York, N. Y.—The Public Service Commission for the First District announces that it will hereafter participate actively through its counsel, in proceedings before the Interstate Commerce Commission which involve freight and passenger rates vitally affecting the public interest of the city of New York. Many cases greatly affecting freight rates of, and thus the cost of commodities largely used in New York city, are heard each year by the commission at Washington, merely as an issue between shippers and railroads, without representation of the public point of view and the public interests. The commission will therefore hereafter undertake to fulfill the duty of expertly representing the public interests of the people and shippers of the city.

Legislature Gives City New Charter.

Rome, Ga.—The bill amending the city charter has passed both the senate and house, and has been signed by governor Dorsey. Before becoming operative, however, the bill will be submitted to a vote of the qualified electors of the city of Rome. It provides that the first commissioner shall, at the expiration of thirty days, call a special election. Under the charter the election must be held not less than twenty nor more than thirty days from the date of call and it will therefore probably be held at some time between the beginning and middle of October. There are many important changes in the city government proposed by the charter amendment. Among them are the following: Makes seven directors instead of five commissioners. Fixes salary of each director at $200 per annum. Makes salary of chairman of directors $500 a year, instead of $3,900, as first commissioner now receives. It names Arrington, Holbrook, Jones, Lindsey, C. Terhune and C. O. Walden as first board of directors, with D. W. Simmons as first chairman, to serve until April 1, 1918. After that, seven directors, one from each ward, are to be elected for two year terms. Directors elect one of their number as chairman. Directors elect secretary, three tax assessors, sexton and auditor. People elect city attorney, recorder and city physician. All other city employees and officers are placed under civil service rules and they are appointed and their salaries fixed by a civil service board consisting of J. H. O'Neill, John M. Graham, H. R. McClatchey, J. D. McCartney and J. M. Bradshaw. The civil service board receives no salary. Provides for selection of city depository upon competitive bid for interest upon deposits. Abolishes offices of sanitary inspector and tax receiver. Places duty of sanitary inspector upon chief of police. Provides numerous rules for civil service in various city departments. Makes recorder turn into city treasury costs received in cases where he binds defendants over to state courts.

STREET CLEANING AND REFUSE DISPOSAL

City Incinerator Profitable.

San Jose, Cal.—The city incinerator is an efficient institution, according to reports brought to the office of the city manager. During the past five months, in which an accurate account has been kept of the cost of operation, it has been found that the expense is $6.28 per day. The cost of burning the refuse is $.447 per ton. The cost of labor and fuel for the five months is $807.85. The city receives $300 a month in garbage collection licenses, making the income for the five months $1,500. While there are incidentals in the running expenses which are not included in the labor and fuel costs, the incinerator is decidedly a money-making institution. The incinerator not only disposes of all the garbage and refuse of San Jose, but it serves as an animal crematory as well. Many dead dogs, cats and horses have been disposed of. Engineer Hunt states that there is no odor from the plant. Seventy per cent of the property owners and residents of this city, however, do not patronize the garbage wagons, according to a statement by city manager Reed to the city council during the report of the special investigation conducted by his office into the business methods of the San Jose Scavenger company. Manager Reed said that a number of houses where the occupants dispose of their garbage by means other than the public incinerator were found to throw the edible portions out to chickens, and that from a close canvass of certain streets it was obvious that the neglect to do away with the refuse according to law amounted almost to a complete boycott of the above company's accommodations. Chauncey Tramutolo, counsel for the scavenger company, explained that he was present to show that the concern was in no way responsible for the neglect, and to correct if possible the charge made by the investigators that the books of the company were not complete in reference to addresses of customers. He declared that the scavengers had not been told of the conditions governing their business; that the reason some of the wagons were out later than was allowed by law was because many of the stores were late in closing, delaying the gathering of garbage. City manager Reed showed that the number of houses not visited by a garbage wagon in this city ranged from 21 per cent to 94 per cent on the different streets. City manager Reed explained that if each family would pay 20 cents a month for the collection of its garbage the city could be kept clean. He said that the present price of 35 cents did not meet popular approval, but admitted that the men did not receive the pay that they deserved for doing this class of work, averaging from $75 to $80 a month. Upon the suggestion of the city manager, it was decided to call a conference of the health board, city engineer and city attorney to draw up a revision of the present scavenger ordinance.

Increase Garbage Collection Charge.

Lansing, Mich.—Lansing's garbage collection is to be operated under a new ordinance calling for the annual charge of $1 instead of the coupon charge of 10 cents a week. The new ordinance was adopted by a nine to six vote by the aldermen. The measure was backed by mayor Reutter. The ordinance prior to the adoption of the 10 cents a week charge called for $1 a year. A refund is to be made to coupon holders. Alderman Ferle fought against the adoption of any collection system which would be a direct expense to the people. He said that the people had voted for a free collection of garbage and that for this purpose $21,000 had been raised. There is a possibility expressed by the mayor of a change being made in the management of the collection. The present manager, William Gilkey, is required to give his attention both to the garbage collection and to the city piggery. The department has found that its chief trouble has been retaining its labor. The city has bought 2,000 new cans at $1.40 each, a number of which are already in service. The mayor expressed the opinion that the city would in a short time purchase an additional truck to aid in the collection. He expects to secure a large profit for the city through the piggery.

The High Cost of Litter.

New York, N. Y.—In an effort to save the city $25,000 a year by preventing littering of the public parks, the Anti-Litter League has called for boys and girls, as well as for their fathers and mothers, to act as "block captains" to report all persons who throw newspapers or other refuse on the lawns in public parks or in the streets when receptacles are furnished for all refuse. Speaking of the work of the league in aiding the park department, commissioner Ward said: "The question of litter has a very direct ratio on the amount of taxation. It is a matter of $18,000 if we could get less littering in the parks. This can be done by means of such a splendid organization as the Anti-Litter League. We find the litter question very serious in the park department. A survey of other cities disclosed the fact that in such cities as Chicago the littering is not such a problem as it is here. We found the average littering of the parks

in St. Louis much less than it is here, and that if the same ratio of cleanness were maintained here we would spend $22,000 less every year on the one item of picking up papers and other refuse. Here we have visited schools to talk upon the seriousness of littering the parks, and the result was encouraging. We put up to the hundreds of organizations holding celebrations in the parks the responsibility of organizing their forces and picking up after they had finished. We refused to grant permits again to organizations that failed to do this. We found an extraordinary amount of littering in the small parks. Numbers of people carry out their rubbish in cans and dump it in the park and go away rejoicing. The Anti-Litter League also sends out instructions for aiding in the prevention of disease by keeping the streets clean, especially in hot weather, when such diseases as infantile paralysis may be transmitted easily. "Don't cast litter into the streets," says the league. "It is worse than 'casting pearls before swine.' It is simple and easy, dignified and thoughtful to place your discarded newspaper into a city-maintained receptacle. 'Can it all.'"

MISCELLANEOUS

City Buys Coal Mine.

Evansville, Ind.—Mayor Bosse has secured leases on 640 acres of coal land lying between the E. S. &. N. traction line and the Southern railway, between Chandler and Boonville. In a short time this tract will have a coal mine producing 1,000 tons daily. It will be a municipal coal mine and will be used to supply the local market at a reasonable price. If the mayor's scheme works out, the mine will be managed by the water works department. Howard Durbin, superintendent of the water works, has written to the state public service commission asking the right to manage the coal mine. If the public service commission cannot give the permission, mayor Bosse will ask the governor to call a special session of the legislature so a law could be passed allowing cities to manage coal mines. If the public service commission cannot allow the water works department to issue securities on the mine and no provision is made by the legislature, the mayor will manage the mine as a private undertaking and will keep the price down within reason. The vein of coal on the tract secured by mayor Bosse is at a depth of 80 feet and from 5 to 7 feet wide, averaging 6 feet. At a depth of 250 feet there is another vein. The proposition will require $50,000 and the mayor will get this money himself, putting up private collateral. This will sink the shaft and build the tipple. A start will be made with pick mining. Walter Korff will have charge of the mine. After the mayor has started the mine he wants the water department to take it over and pay for it in instalments, then put in more money and make it up-to-date, with electric appliances, trucks, etc. The coal will not be sold at bare cost, but the mine will be run on business lines, just as the water works is. The mine is close enough to the city that motor trucks could be used for transportation in case of necessity. The mayor may ask the E. S. & N. and the Public Utilities company to co-operate in hauling it to all parts of the city over the electric lines.

Effective Work of Weights and Measures Bureau.

New York, N. Y.—Joseph Hartigan, who recently retired as commissioner of the Mayor's Bureau of Weights and Measures, says in a summary of the accomplishments of the bureau since he took office on May 1, 1914, that it "would be distinctly unfortunate to the people of the city to consolidate the bureau with any other department. There is no more wholesome force for trade honesty in the city than that of this bureau. It is so intimately in touch with the factory, store and home that it assumes a protectorate over the community pocketbook. It is essentially a 'people's bureau,' and has been conducted by me to do that primary service." Some of the bureau's many accomplishments during the past three years and three months, as pointed out in the summary, are as follows:

The enforcement of the net weight on containers law and its compliance with by 85,000 dealers in all character of commodities sold in containers.

Co-operation with the New York State Department of Weights and Measures in the successful criminal prosecution of wholesale packers of wrapped hams and bacons, resulting, the commissioner says, in a saving to retailers and consumers of this city of approximately $1,200,000 yearly.

Enforcement of the state and city coal law against wholesale and retail dealers in coal and obtaining evidence of short weight upon which the city and state collected penalties through the civil and criminal courts. Jail sentences invariably accompanied those offenders who dealt with the poor.

The discovery and disruption of a professional syndicate of persons who controlled 1,000 of the 15,000 coal, wood and ice cellars by levying tribute of $1 on each place daily, with intent to defraud the alleged proprietors, who saddled the extra cost on the poor who patronized such dealers.

Successful criminal prosecution under state law of dealers in jewelry and precious stones who practiced fraud on gullible customers by representing and obtaining money for fictitious and false values in weight and quality.

In an effort to correct conditions as to a true representation of the weight of bread the bureau made repeated and persistent attempts to enforce and prosecute under state laws and city ordinances and finally secured the co-operation of the manufacturing bakers to obtain a compliance with the law, which subsequently was nullified by action of the appellate courts.

The abuses of overfeeding and overcropping of live poultry with a view to increasing their weight artificially, both in transit and at receiving terminals, were eliminated as the result of the bureau's action in bringing prosecutions and by its educational activities among the men in the live poultry trade.

The bureau's new methods in its co-operation with the department of street cleaning, in the removal of snow—the bureau measures all vehicles used in hauling snow—protected the city in three years against losses of approximately $20,000.

LEGAL NOTES

A Summary and Notes of Recent Decisions—Rulings of Interest to Municipalities

Bids for Street Work—Accuracy of Estimate.

(N. J.) In soliciting bids for general repair work on city streets, it is impossible to state accurately all work to be done, and it is sufficient if conditions be stated as definitely as practicable.—Devlin v. Jersey City, 100 A. 208.

Repairing Streets—Definiteness of Contract.

(N. J.) A contract for repairing city streets need not define all work to be done, streets to be paved, etc., since this must necessarily be left to the city's judgment.—Devlin v. Jersey City, 100 A. D. 208.

Ordinance—Resolution—Distinction.

(Ga. App.) The distinction between an ordinance and a resolution is usually considered to be that, while a resolution deals with matters of special or temporary character, an ordinance prescribes some permanent rule of government.—City of Rome v. Reese, 91 S. E. 880.

Bid Higher Than Appropriation—Procedure.

(N. Y. Sup.) A bid for the construction of a building for a city in excess of the appropriation existing at the time is invalid, and when the appropriation is increased a new advertisement and reletting becomes necessary.—Klinck v. Pounds, 163 N. Y. S. 1008.

Drainage System—Best Design—Decision

(Tex. Civ. App.) Where the proper authorites of a city have determined that a proposed system of drainage is necessary, the question whether such system is the most feasible or the least expensive cannot be considered by the courts.—City Com'rs of Port Arthur v. Faint, 193 S. W. 334.

Fire Engines—Restricting Specifications.

(N. J. Sup.) The adoption of specifications for fire engines does not restrict competition so as to invalidate contract for their purchase, where all manufacurers could construct machines in accordance with the specifications, though one was equipped to construct them at less expense than others.—Bauer v. Town of West Hoboken, 100 A. 223.

Accepting Part of Street—Liability for Defects.

(Va.) Whether a municipal corporation accepted part of a street so as to be liable for defects in it, was made a jury question, where Acts 1906, c. 76, incorporating the town, referred to a map prepared by its council pursuant to Code 1904, § 1014, and the town had done some repairing on such portion of the street.—Town of Virginia Beach v. Ogle, 91 S. E. 747.

Power to Discontinue Streets—Source.

(N. Y. Sup.) The Legislature has the right to invest, as it did by Rochester City Charter, §§111, 121, the common council with power to discontinue streets.—In re Joiner St. in City of Rochester, 164 N. Y. S. 272.

Maintaining Streets—Obligation.

(N. J.) The obligation under a maintenance bond for repairing city streets, and where exact amount of work cannot be specified in contract, will depend on amount of work done.—Devlin v. Jersey City, 100 A. 208.

Establishing Alley—Prescription.

(Mich.) An alley may be established by prescription, although the landowner had no actual notice of the user, provided he should have known of it.—Village of Manchester v. Clarkson, 162 N. W. 115.

"Stone" Walks—Concrete.

(Miss.) Under a city charter conferring power to provide for building of walks with "stone," etc., walks may be ordered built of concrete, composed of gravel, Portland cement, and sand.—City of Vicksburg v. Robinson, 74 So. 617.

Maintenance—When Necessary.

(Md.) In absence of fraud or bad faith, the courts will not review a municipal corporation's determination that paving and drainage repairs are necessary.—Johns Hopkins Club Bldg. Co. of Baltimore City v. City of Baltimore, 100 A. 298.

Abolition of Office—Emoluments.

(Ga. App.) If the abolition of plaintiff's existing municipal office by the succeeding city commission was invalid, and plaintiff in good faith was willing to perform its duties, he was entitled to its emoluments.—City of Rome v. Reese, 91 S. E. 880.

Power to Discontinue Streets—Payment for Damages.

(N. Y. Sup.) Where its charter authorized a municipality to discontinue streets, an ordinance discontinuing streets to furnish station facilities for railroad companies is valid; ample provision being made for the payment of private damages suffered.—In re Joiner St. in City of Rochester, 164 N. Y. S. 272.

Sewer System—Description.

(Ill.) A proposed sewer system for village of 2,500 inhabitants is no less local improvement because it is proposed within the village to connect with another and private sewer, where no such connection outside village limits was intended.—Village of Bradley v. New York Cent. R. Co., 115 N. E. 640.

Unauthorized Agent—Liability of Municipality.

(N. J.) A municipal corporation may be liable for work done and materials furnished it on the order of an unauthorized agent, when the contract for such supplies is one that is within the scope of its corporate powers.—Frank v. Board of Education of Jersey City, 100 A. 211.

Disqualifications for Office.

(Pa.) Where Act March 31, 1860 (P. L. 400) § 66, and Act May 28, 1907 (P. L. 262), prescribe certain disqualifications for office of councilman, he must get rid of them before he is appointed or elected; but, if law merely forbids him to hold office, it is sufficient if he qualifies before he is sworn. Commonwealth v. Kelly, 100 A. 272.

Police Power—Reasonability of Ordinance.

(Cal. App.) Ordinance of city of Venice prohibiting in any public or uninclosed place playing a musical instrument, making loud noise, calling out goods or attractive features of amusement, etc., without permit, held void as unreasonable.—Ex parte Wisner, 163 P. 868; ex parte Messenheimer, Id. 869.

Initiative—Election—Validity.

(Okla.) Where initiative was filed with city clerk for enactment of ordinance, and the next day the mayor called an election on date other than next city election at which city officers were elected without submitting it to council, and without council's order of special election thereon, ordinance was illegally submitted, and election was void.—Ex parte Griggs, 163 P. 325.

Right to Use Sidewalk for Loading and Unloading.

(Ala.) An abutting property owner has the right to use the sidewalk in front of his premises when reasonably necessary for loading and unloading his goods and merchandise.—Walker v. John Smith, T. 74 So. 451.

Constructing Sewer—Assessments.

(Ill.) If proposed sewer system can be constructed within estimate and no property is assessed more than it will be benefited, construction cannot be said to be unjust or oppressive.—Village of Bradley v. New York Cent. R. Co., 115 N. E. 640.

Purchase of Engine—Payment by Taxes.

(N. J. Sup.) Act April 15, 1911 (P. L. p. 224), as amended March 28, 1912, (P. L. p. 358), did not deprive a town council of its power under Act March 7, 1895, (P.L. 218), §§47, 52, to contract for a fire engine and pay for it by taxes for one year.—Bauer v. Town of West Hoboken, 100 A. 223.

Removal from Office—Vacancy.

(Pa.) Although Borough Act May 14, 1915, (P. L. 312), does not specifically provide that councilman's removal from the borough shall leave a vacancy in his office, yet where facts disclose a removal, and an actual abandonment of office, a vacancy is created.—Commonwealth v. Kelly, 100 A. 272.

Compensation for Extra Work.

(Wis.) A municipal contractor is not entitled to recover compensation for alleged extras where price therefor was not agreed upon in writing before he performed work and claim was not presented to city within 14 days from time alleged items of expense were incurred. Thomsen v. City of Kenosha, 161 N. W. 735.

Assessments—Reasonability.

(Mo.) Where it appears that an assessment for present benefits from a main sewer is reasonable, the construction will not be enjoined because a future assessment for laterals, together with the assessment for the main, might exceed the present value of the land.—Whitsett v. City of Carthage, 193 S. W. 21.

Bonds for Filter Plant—Vote.

Ohio—Municipal corporation issuing bonds to provide for filtration plant in compliance with orders of state board of health may issue the full issue of 5 per cent. in any one fiscal year without submission to vote of electors.—State v. Dean, 116 N. E. 37.

Maintaining Street—Contract.

Florida—Contract for maintenance of paving in city street should not be construed to deprive city of its right to change character of pavement to meet new conditions, when contract may be so construed as to preserve city's governmental rights.—Manley-Stearns Const. Co. v. City of Miami, 75 So. 27.

Power of City Board of Health.

New York Sup.—City board of health has power to enact sanitary ordinance having force of law within its juridiction and has summary powers to protect people of community against unsanitary conditions.—Mannix v. Frost, 164 N. Y. S. 1050.

Leasing Public Building—Injunction.

Minnesota—A citizen and taxpayer may not enjoin municipal officers from leasing a building not needed for public use, unless the municipality and its officers are acting ultra vires and such acts may injuriously affect his rights.—Anderson v. City of Montevideo, 162 N. W. 1073.

Storing Volatile Oil—Regulations of Garages.

New York—Regulation adopted by former municipal explosives commission of city of New York, made part of Code of Ordinances by Laws 1911, c. 899, amending charter by adding section 778c, later amended by Laws 1914, c. 495, which regulation provided no garage permit, authorizing storage of volatile oil, should be issued for premises without separator, preventing escape to sewer, was not void ordinance, so that legislative adoption of it did not give it force of statute.—Stubbe v. Adamson, 116 N. E. 372, 220 N. Y. 459.

NEWS OF THE SOCIETIES

Calendar of Meetings.

Sept. 10-12.—AMERICAN CHEMICAL SOCIETY. Fifty-fifth annual convention, Boston, Mass.

Sept. 10-15.—NATIONAL EXPOSITION OF SAFETY AND SANITATION. Annual conference, New York, N. Y. Secretary, W. C. Cameron, Continental and Commercial Bank building, Chicago, Ill.

Sept. 11-13.—AMERICAN ASSOCIATION OF PARK SUPERINTENDENTS. Annual convention, St. Louis, Mo. Secretary, Roland W. Cotterill, 533 City Hall, Seattle, Wash.

Sept. 11-14.—INTERNATIONAL ASSOCIATION OF MUNICIPAL ELECTRICIANS. Annual convention, Niagara Falls, N. Y. Secretary, Clarence R. George, Houston, Tex.

Sept. 11-14.—NEW ENGLAND WATER-WORKS ASSOCIATION. Annual convention, Hartford, Conn. Secretary, Willard Kent, 715 Tremont Temple, Boston, Mass.

Sept. 18-20.—LEAGUE OF IOWA MUNICIPALITIES. Annual convention, Iowa City. Secretary, Frank G. Pierce, Marshalltown, Ia.

Sept. 18-20.—LEAGUE OF VIRGINIA MUNICIPALITIES. Annual convention, Lynchburg, Va. Secretary, L. C. Brinson, Portsmouth, Va.

Sept. 24-29.—LEAGUE OF CALIFORNIA MUNICIPALITIES. Annual convention, Santa Rosa, Cal. Secretary, Wm. J. Locke, Pacific Building, San Francisco, Cal.

Sept. 24-29.—THIRD NATIONAL EXPOSITION OF CHEMICAL INDUSTRIES. Exposition, Grand Central Palace, New York City.

Sept. 25-27.—SMOKE PREVENTION ASSOCIATION. Annual convention, Columbus, O. Secretary, Frank A. Chambers, City Hall, Chicago, Ill.

Sept. 27-29.—AMERICAN AND CANADIAN ENGINBERS AND ARCHITECTS OF NORWEGIAN BIRTH OR DESCENT. Informal congress and re-union, Chicago Norske Klub, Chicago, Ill. Chairman, Committee on Arrangements, Joachim G. Giaver, consulting engineer, Chicago, Ill.

Oct. 15-17.—NATIONAL HOUSING ASSOCIATION. Annual conference, Hotel La Salle, Chicago, Ill. Secretary, Lawrence Veiller, 105 East 22d St., New York City.

Oct. 16-19.—LEAGUE OF KANSAS MUNICIPALITIES. Annual convention, Wichita, Kan. Secretary, Homer Talbot, University of Kansas, Lawrence, Kan.

Oct. 17-18.—LEAGUE OF MINNESOTA MUNICIPALITIES. Fifth annual convention, St. Cloud, Minn. Secretary-treasurer, Richard R. Price, University of Minnesota, Minneapolis.

Oct. 22-24.—AMERICAN CIVIC ASSOCIATION. Annual meeting, St. Louis, Mo. Secretary, Richard B. Watrous, 914 Union Trust building, Washington, D. C.

Oct. 28-30.—TEXAS CONFERENCE ON SOCIAL WELFARE. Annual convention, Houston, Texas.

Nov. 19-24.—CITY MANAGERS' ASSOCIATION. Annual meeting, Detroit, Mich. Secretary, W. L. Miller, City Manager, St. Augustine, Fla.

Nov. 20-23.—PLAYGROUND AND RECREATION ASSOCIATION OF AMERICA. Recreation Congress, Milwaukee, Wis. Secretary, H. S. Braucher, 1 Madison Ave., New York, N. Y.

Nov. 21-24.—NATIONAL MUNICIPAL LEAGUE. Twenty-third annual meeting, Hotel Statler, Detroit, Mich. Secretary, Clinton Rogers Woodruff, 703 North American Bldg., Philadelphia, Pa.

Jan. 15-17.—VIRGINIA GOOD ROADS ASSOCIATION. Seventh annual convention, Richmond, Va. Secretary, C. B. Scott, Richmond, Va.

Feb. 6-13.—FIRST CHICAGO CEMENT MACHINERY AND BUILDING SHOW. Supersedes annual Chicago Cement Show. Held at the Coliseum, under direction of the National Exhibition Co.

Kansas Good Roads Association.

J. Frank Smith, president of the Kansas Good Roads Association, announces the following program for good roads day at the Kansas Free Fair, Topeka, Wednesday, September 12. The meeting will be held in the big pavilion at the fair grounds, beginning at 10 a. m.

Address by L. F. Davidson Glasco, Kan., director Midland trail, "How and When to Pave the Midland Trail."

Address by W. H. Crawford Horton, Kan., "The Horton-Holton-Topeka Scranton Highway Should Be Paved. Let's Pave It Now."

Address by W. W. Watson, Salina, president Meridian Road, 'What We Are Doing and Expect to Do on Our Trail."

Address by W. S. Gearhart, state highway engineer, "What Type of Road to Build in Kansas."

Address by E. R. Moses Great Bend, state highway commissioner, "Federal Aid."

Texas Conference on Social Welfare.

The State Conference of Social Welfare will meet in Houston October 28, 29 and 30 to discuss social problems facing the state of Texas. This year on account of the increased social work the war has brought on and the new activities that are being started in connection with the four encampments in this state, there is expected an unusually large meeting.

The program has been outlined to cover the most important social questions confronting Texas, and prominent social workers from all over the state will take charge of the section meetings and secure speakers for them.

For the evening meetings some of the best speakers on social questions in the United States will be brought. Three have been invited, but there has not been time yet to hear from them.

The full program, with the names of the speakers and section chairmen, will be published as soon as possible. The program as now outlined follows:

Sunday, October 28: Opening meeting 3.30 p. m., banquet hall, city auditorium. Invocation. Welcome by mayor. President's address. Challenge of a Changing Social Order.

Monday, October 29: Appointment of nominating, time and place, resolutions committees, by president. 9.30 a. m. family problems, volunteers, desertion, illegitimacy, intemperance, etc. 11 a. m., health. Anti-tuberculosis, public health nursing, social hygiene, feeblemindedness and insanity, municipal sanitation. Luncheon—Organizing the community, city departments of public welfare, finance, federations, social centers, organizing small communities, church co-operation, training schools for social service, councils of social agencies. 2.30 p. m., business meeting. Future Possibilities of the Conference. Election of officers. 4 p. m., Trip to Social Service Bureau Neighborhood houses. 8 p. m., The War and Social Work. Social Work of the Encampments.

Tuesday, October 30: 9.30 a. m., Social Problems of the War, civilian relief, Red Cross work, recreational work. 11 a. m., child welfare, juvenile court, mothers' pensions, maternity homes, child placing agencies, street and messenger work, humane societies. Luncheon—Correction and reform, industrial problems, employment and vocational training, handicapped men, social insurance, child labor, industrial safety. 2.30 p. m., negro problems. 4 p. m., trips to Girls' School, Boys' School, Faith Home, Baptist Day Nursery, Municipal Farm. 8 p. m., a state program for child welfare. Adjournment.

The committee in charge of Houston arrangements consists of representatives from the Houston Foundation, Chamber of Commerce, Rotary Club, Young Women's Business League, Young Men's Business League, Houston Social Service Bureau and the Texas School of Civics and Philanthropy.

Western Pennsylvania Firemen's Association.

The Western Pennsylvania Firemen's Association at its recent meeting at Irwin elected the following officers: President, William E. Debolt, of Connellsville; vice-president, G. H. Bohland, of West Homestead, Thomas W. King, of East McKeesport, and Peter O'Brien, of Swissvale; secretary, W. H. Sharah, of Braddock; treasurer, James H. Steel, of Wilkinsburg; delegate to the state convention at Butler, Quay R. Hewitt, of Punxsutawney. Meyersdale was chosen as the place of meeting in 1918.

Massachusetts Firemen's Association.

At the annual meeting of the association held at Springfield, Aug. 13 and 14, officers were elected as follows: President, John J. Kelly, of Lawrence; first vice-president, James J. McNish, of Chicopee Falls; second vice-president, J. M. Gallaghan, of Taunton; third vice-president, J. M. Mahoney, of New Bedford; secretary, Thomas J. Powers, of Worcester; treasurer, E. A. Slattery, of Fitchburg; board of directors, F. H. Gould, of Boston; T. J. Doherty, of Holyoke; Thomas Burke, of Fall River; J. E. Hickey, of Salem; J. L. Parker, of Brockton; John L. Day, of Lynn; E. A. Walsh, of Springfield; J. E. Manning, of Pittsfield; M. Joseph Manning, of Milton.

Virginia Police Chiefs' Association.

The Virginia Police Chiefs' Association, in convention at Newport News, Aug. 15, refused to request the passage of a search and seizure law, selected Roanoke as next years place of meeting, and elected the following officers: J. M. Seay, Lynchburg, president; Leslie Fergus, Farmville, vice-president; Chief Perry, Fredericksburg, second

vice president; Chief C. A. Hamilton, Roanoke, secretary and treasurer.

The resolution requesting a search and seizure law was opposed by Major Kizer, of Norfolk. The association finally passed a resolution calling the attention of the legislature to the difficulty experienced in enforcing the law, and leaving the matter entirely with the legislature without recommendation of any kind.

League of Wisconsin Municipalities.

The annual convention of the League of Wisconsin Municipalities, which was announced for Aug. 15 to 17, has been postponed until the last week of September. Ford H. MacGregor, Madison, Wis., is Secretary of the league. The program has been modified, and it is expected that ex-President Roosevelt will address the convention.

The Engineering Council.

The formation of an Engineering Council is the outgrowth of a real need for proper consideration of questions of general interest to engineers and to the public, and to provide the means for united action upon questions of common concern. Many such questions have come up in the past and will arise in greater number in the future. This war has brought out very impressively the actual need for united action of some kind. At present the Council is concerned only with four Societies, because that seemed the most practical way of getting a group of men together to answer the immediate needs, but these Societies do not assume to speak for all engineering societies in the country. Criticism that they are exclusive in any way is utterly mistaken. There is the hope that such a Council, by proving itself effectively may lead to much wider cooperation in a strictly representative body for all engineers, and thus pave the way for a very much larger union in the future.

How can the Council be enlarged? By a union of all Societies, either as the outgrowth of the present Council or by a congress of engineers leading to united action by all Societies. The first method will be the most natural one because many local societies and national societies also have a large membership in the four Societies at present concerned. We have three classes of engineers to reach: first, those who are members of local societies and not members of national societies; second, those who are members of national societies and not members of local societies, and third, those who are members of no society. The last named class constitutes a very large number in our profession. We are almost as mixed as American citizenship and we suffer therefrom just as much as America with a population representing every race and every people in Europe. There can be no question of the enormous advantage of union. That union should be completed by strengthening the existing agencies and not by the formation of new societies. The national societies are thoroughly national, notwithstanding an occasional complaint that they are run by New York. If they have not been able to

(Continued on page 244.)

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

Miami, Fla., is planning a SEWAGE DISPOSAL system, FILTRATION plant and pumping station. B. H. Klyce, Miami, is engineer.

Defiance, O., is having plans prepared for a WATER PURIFICATION system by the W. J. Sherman Co., Nasby Bldg., Toledo, O.

Lafayette, La., is receiving bids on ten miles of SEWERS and DISPOSAL works. The J. B. McCrary Co., Atlanta, Ga. are the engineers.

For the construction of a POWER plant and additions to the FILTRATION plant and water system, Tulsa, Okla., has called into consultation Stevens & Stiles, engineers, Kansas City, Mo.

Murray, Ia., has been considering the construction of WATERWORKS and SEWERS and consulting on the subject with E. T. Archer & Co., 609 New England building, Kansas City, Mo.

Plans for BRIDGES to be built by Seminole County, Wewoka, Okla., and Garvin County, Wynne Wood, are being made by W. E. Moore, 1006 Campbell building, Oklahoma City, Okla.

Seymour, Ia., is receiving bids for constructing a SEWERAGE system from plans prepared by M. G. Hall, consulting engineer, Centreville, Ia.

Okmulgee Co., Okla., in laying out a county ROAD system, called upon Harrington, Howard & Ash, Orear-Leslie Bldg., Kansas City, Mo. 101 plans, etc.

Bids will soon be received on a WATERWORKS system for Shamrock, Okla. Plans for the improvement have been prepared by the Mackintosh-Walton Co., Oklahoma City, Okla.

In constructing new WATER MAINS and SEWERS, South Milwaukee, Wis., has been consulting with Alvord & Burdick, engineers, 8 So. Dearborn street, Chicago.

For the construction of a complete PUMPING plant in connection with drainage work for the Gregory Drainage District, Gregory Landing, Mo., plans were prepared by the Edmund T. Perkins Engrg. Co., First Natl. Bank Bldg., Chicago, and Illinois State Bank Bldg., Quincy, Ill.

PERSONALS

Davis, Frank P., has joined the designing department of the Bureau of Yards and Docks, Washington, D. C. He was formerly assistant engineer with the Rapid Transit Subway Construction Co.

Kneisel, Arthur, national treasurer for the American Association of Engineers, died in Chicago on August 17, 1917. He was born in Lexington, Ky., in 1880, and received his early education in the Lexington schools, later graduating from the University of Kentucky. He went to Chicago over fifteen years ago and was engaged as a telephone engineer and patent attorney. At the time of his death he was president of the Utilities Development and Sales Company.

Lederer, Arthur, has been appointed director of the State Hygienic Laboratory, Morgantown, W. Va. He was formerly connected with the Chicago Sanitary District.

Nagle, James C., has been appointed dean of engineering and professor of civil engineering in the Agricultural and Mechanical College of Texas, succeeding D. W. Spence, whose death occurred in June. Mr. Nagle is a Virginian by birth, but most of his life has been spent in Texas. He graduated from the University of Texas in 1889 with a B. S. degree in engineering, and obtained an M. A. degree in 1892. In the same year he obtained a C. E. degree from the Western University of Pennsylvania, now the University of Pittsburgh, and in 1893 an M. C. E. degree from Cornell. He was a professor of civil engineering in the Agricultural and Mechanical College of Texas for about twenty years and in 1911 was also made dean of engineering. He resigned from this position in 1913 to become chairman of the Texas board of water engineers, and has occupied that position since then. During his professional career he has often been engaged on construction work of various kinds, principally railroad, bridge and irrigation work. Mr. Nagle is the author of a field manual for railroad engineers and of numerous technical papers. He is a past president of the Texas Association of Members of the American Society of Civil Engineers, past president of the Texas Academy of Science, and a major in the Engineers Reserve Corps.

Shumway, Arthur L., city engineer of Camas, Wash., has left for immediate service in France with the Tenth Engineers.

Vail, E. M., is now in charge of the northern division headquarters officers of the New Jersey state highway department, located at Plainfield.

Van Horn, R. E., who has been connected with the Dayton, O., bureau of sewerage design, is now with the Coventry Land Improvement Co., Akron, O., as assistant engineer.

NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

OLSEN CONCRETE MIXER.

Double Drum Batch Mixer of Original Design.

The Olsen batch mixer is designed on the principle that concrete should be mixed dry first and then wet without washing the cement off the aggregate in order to get best results. The mixer therefore has two drums, one for mixing dry and the other for wetting.

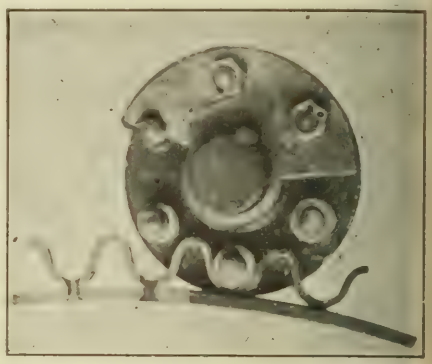
The two drums are securely fastened and revolve together driven by the same driving pinion. The mixing drum is of larger diameter and the wetting drum scatters and mixes the batch more —the proportions being determined by years of actual use. The large mixing drum scatters and mixes the batch more quickly and coats the aggregate with cement and distributes the coarse aggregate through the batch uniformly. As a test of thorough mixing, it is claimed that in two revolutions of the drum five pounds of color and a sack of cement can be mixed to uniform color. In the wetting the batch should not be scattered and for that reason the wetting drum is smaller in diameter.

In the first compartment of the mixing drum specially designed mixing shovels are rigidly fastened to the drum and so placed as to lift, scatter, interchange, reassemble and thoroughly mix the materials. Each mixing shovel carries a certain part of its load to the top and discharges it on the top of the batch when the port is closed. When the port is open the load is discharged on an inclined chute fastened to the wetting side of the port and in this way into the wetting drum, where simultaneously the required amount of water is admitted into the curved pipe which carries the port and transfer chute. The dry mixed concrete and the water enter the wetting drum at the same time, going in the same direction at the same rate of speed. The specially designed shovels in the wetting drum give the batch a rolling motion, always moving the batch towards the discharge end where it accumulates in the wheel barrow loader ready for use.

In operating, the port between the drums being closed, a batch is introduced into the mixing drum. When it is dry mixed to a uniform color, in about one revolution of the drum, the port is opened and the batch is discharged into the wetting drum. The water is admitted to the pipe three or four seconds before the port is opened to give the water time to reach the wetting drum, but about the same time as the concrete. When the batch has been discharged into the wetting drum, the port is closed and another batch is introduced into the mixing drum, and so on. When a batch is discharged from the mixing drum into the wetting drum the preceding batch is discharged from the wetting drum by opening the discharge end with the wheelbarrow loader.

The speed of the mixer is limited only by how fast the operator can mix a batch dry and discharge it into the wetting drum. There is no time lost by the charging crew and the wheeling crew waiting for another, as the charging and discharging of the mixer do not interfere with each other. The double drum mixer can therefore deliver a batch a minute.

The double drum construction also enables the mixer to have a large low feed opening and a high discharge. Another advantage claimed is the low cost of operation. Portability is still another feature of service. The wide range of the work of the mixer is also important. Concrete may be mixed dry enough for tamping work, such as blocks, tile, etc., and wet enough for pouring with equal facility. The machine, because of the two drum construction, is also very easy to keep clean.



FRICTIONLESS ROLLER PINION DRIVE.
(One wall cut away.)

The machine is specially built for heavy service. A tubular frame is used and axles are made of the same materials, making a very strong combination. The castings are semi-steel and crucible steel where necessary. The drums, wheelbarrow loader and inside cone are of open hearth iron. The heads of the drums are made strong and light, being spun from a sheet of iron. The bearings are of an original saddle type, properly oiled by center wel and self-aligning to withstand vibrating wear. The countershaft has large split babbitted bearings. The mixer is equipped with a spur gear from the engine to the countershaft and from the countershaft to the drum with a driving pinion and sprocket. The drive consists of a two-walled pinion between the walls of which is set case-hardened rollers revolving on case-hardened bolts which drive on a large substantial sprocket, the teeth of which are stamped from a strip of steel riveted between each tooth to a steel band. The weight of the batch is distributed over the countershaft as well as the drum bearings.

The closure on the discharge end or wheelbarrow loader, consists of a stamped steel cone 16 inches in diameter fastened to a steel spindle which has a dust-proof bearing in a forked

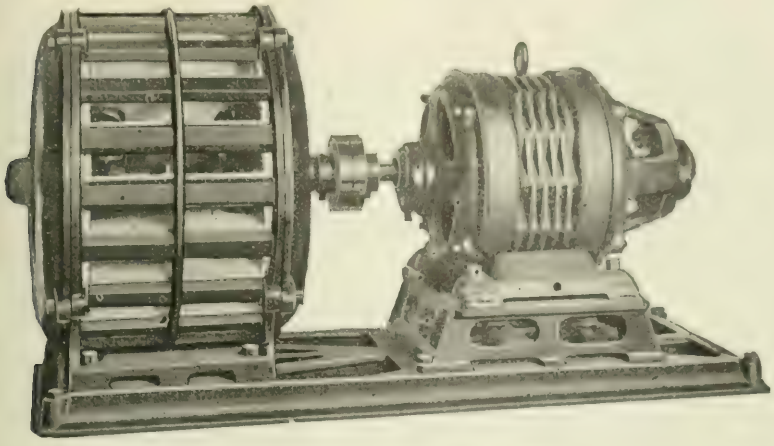
OLSEN NO. 3 DOUBLE DRUM MIXER.

handle and is designed to close against an iron ring on the discharge end of the wetting drum. When this is closed the concrete is discharged into it so that when it is opened the accumulated concrete is instantly discharged. It serves the several purposes of closing the discharge end, accumulating concrete for the next wheelbarrow load, keeping the concrete mixed and proportioned until dropped and excludes air from the wet concrete.

The No. 3 mixer is of the rear discharge type. The mixing drum is 4 feet in diameter and 16 inches across, while the wetting drum is 28 inches in diameter at the large end, straight for 15 inches and tapers to 16 inches at the discharge end—about 4 feet long altogether. This mixer has an easy capacity of seven yards per hour, and can go up to ten. A special feature of this mixer is that the engine is placed on the rear axle adjacent to one of the rear wheels, which has a wider tire. This makes for easy running and protection against dust and dirt.

The No. 2 mixer has an easy capacity of five yards an hour, and goes up to 70 yards per ten-hour day. The No. 1½ has a three-yard per hour capacity. A No. 4 machine is being prepared for the market, which will have a capacity of 20 yards per hour and will be especially adapted to concrete road work. It will be furnished with or without skip.

The accompanying illustrations show a No. 3 mixer and various features of the design and construction of the machine. It is made by the Olsen Concrete Mixer Company, Elkhorn, Wis.



STERLING SIREN FIRE ALARM.

STERLING FIRE ALARM.

Electric Siren Signal for Calling Firemen.

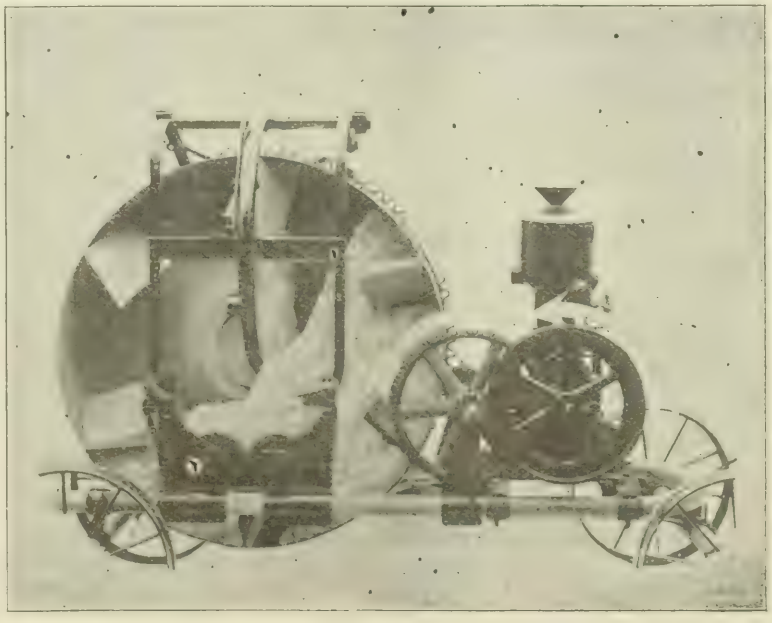
The Sterling siren fire alarm has been developed to meet the demand for a powerful electric signal to replace the fire bell and steam whistle and to obviate the initial expense and maintenance cost of installing a compressed air outfit. The siren note emitted is unusual and distinctive and serves effectively as a fire warning.

Simple construction, few working parts and ample size and strength are the principal features of the Sterling siren. The main part of the siren is naturally the fan or rotor. This is double-faced, made of aluminum and is keyed to a steel shaft which in turn is supported by large end bearings. The Sterling fan is made of aluminum in order to obtain the advantages of reducing the load on the motor and thus adding to the efficiency and flexibility of the outfit. The fan is not carried on the armature shaft of the motor, but is supported by independent end bearings. This construction is designed to eliminate the possibility of the shaft springing and getting out of line and thus allowing the fan to scrape against its housing with the chance of wrecking the whole outfit. The end bearing construction makes for rigidity and reliability. The fan revolves in an iron housing built with properly proportioned air ports—the action of the fan cutting off air at these ports producing the siren sound. The siren and motor are direct-connected and mounted on one base, making a compact and rugged outfit.

When the switch is thrown in and the motor begins to revolve the fan, the first notes are very deep and heavy, but as the motor gains speed the siren note grows higher and higher, until at maximum speed it is a shrill screech—not so shrill, however, as to lose its power of penetration. As soon as the highest note is reached, the switch is thrown off, allowing the siren note to descend the scale. The note should not be kept stationary for more than a few seconds at a time.

In installing, the siren is best raised about fifty feet from the ground and placed on any firm foundation. Good places are the hose-drying tower of the fire house, in a belfry or on the cross beam of a water tower. The wiring is simple and any electrician can do it in a very short time. The motor is covered with a weatherproof housing. The siren itself is not affected by the weather. The switch controlling the siren can be placed wherever desired and more than one switch can be used. A good location for the switch is in the office of the local telephone exchange, where the alarm can be sounded by the telephone operator when she is notified of a fire. Other switches, covered by neat wooden boxes, can be placed in different sections of the town, each switch being independent.

The outfit is being adopted by small towns to serve as a general fire signal for calling out the volunteer firemen. The accompanying illustration shows the outfit, with the motor housing removed. The alarm is made by the Inter-State Machine Products Company, Rochester, N. Y.



SECTIONAL VIEW OF OLSEN MIXER.

INDUSTRIAL NEWS

Cast Iron Pipe.—The high level of prices is still maintained and this is held to be a reason for inactivity. Government buying is slackening and few

municipal lettings reported. No important buying of private or public nature has been reported. Quotations: Chicago—4-inch, Class B and heavier, $68.50; 6-inch, $65.50. New York—4-inch, Class B and heavier, $68.50; 6-inch, $65.50. Birmingham—4-inch, Class B and heavier, $63; 6-inch, $60; Class A, $1 extra.

The MacArthur Concrete Pile and Construction Co., Jersey City, N. J., has been incorporated for the purpose of constructing foundations and pedestal piles. A. F. and J. H. MacArthur and F. H. Hitchcock, of New York, are the incorporators.

Road Machinery in Spain.—The city of Malaga may be in need of road machinery. The attention of manufacturers of road construction machinery is drawn to the law of February 14, 1907, for the protection of national products. According to this law foreign firms can not submit bids for any machinery of a kind which may be obtained in Spain. Steam rollers are manufactured in Spain, but no gasoline road rollers are made. There are no contractors or business houses in Malaga which handle road-making machinery. American manufacturers should address the Ingeniero de las Obras Publicas in each of the 49 provinces of Spain in Spanish or have an energetic representative canvass the entire peninsula. The official in charge of streets in Spanish cities is "El Ingeniero Municipal." The roads in Malaga province outside the city limits are constructed and maintained by the government. The official in charge of the roads in the province is the Ingeniero de las Obras Publicas, Ministry of Development (Fomenta) in Madrid.

NEWS OF THE SOCIETIES

(*Continued from page* 241.)

express the democratic spirit of our country as fully as might be desired it is the fault of the members in all the states and not of the city in which the principal offices are located.

The four Societies concerned at present are the American Society of Civil Engineers, the American Institute of Mining Engineers, the American Society of Mechanical Engineers and the American Institute of Electrical Engineers. They have come together in pairs from time to time in the past for special purposes and there have been general conferences on subjects requiring immediate settlement, but until the Council was definitely organized in June there was no permanent body to advise all the Societies. We have had many fruitful discussions in the past leading to useful action. The Standardization Committee, which has been organized to represent five Societies, has passed upon commercial standards of all kinds. This Committee has great possibilities and it should be enlarged enough so that its influence may become very widespread.

Many problems have already been presented before the Council. Its personnel, made up of twenty-four men, representing equally the four Societies, is well balanced and judicial. The first duty was necessarily the organization and appointment of standing committees, which have already been reported in the press. They might with advantage be mentioned here:

1.—Committee on Public Affairs comprising of C. W. Baker, G. F. Swain, S. J. Jennings and E. W. Rice.

2.—Committee on Rules, comprising of J. P. Channing, Clemens Herschel, N. A. Carle and D. S. Jacobs.

3.—Committee on Finance, comprising of B. B. Thayer, I. E. Moultrop, Calvert Townley and Alex. C. Humphreys.

Certain questions relate, however, to the war and the assistance that engineers can render. A committee to be called the American Engineering Service committee was appointed, with instructions to invite the cooperation of all engineering societies. This committee, in the first instance, consists of A. D. Flinn, of the Civil Engineers, A. S. McAllister, of the Electrical Engineers, George J. Foran of the Mechanical Engineer, C. G. Stone of the Mining Engineers, and E. B. Sturgis, of the Mining and Metallurgical Engineers. Its present duty is the tabulation and listing of the members of the five Societies represented, in order that we, as a profession, may be in a position to take a large part in the industries after peace is declared. This tabulation has already in part been done, but in a rather unsystematic and unequal way. It is hoped that the new Committee, by having additions from other societies, may make a final and lasting tabulation of all the engineers in the United States. The list is to be kept in the Engineering Building for general use in Government problems and in the industries. At present the Committee is devoting its attention to the immediate need of the hour, namely, the procurement of men for special service in the Government. A list of specialists in the Societies has already been completed. There are three methods by which engineers may enter United States service: first, through some organization; second, through individual application to a department of the Government, and third, through selection by the Conscription Law. But this is War Service wholly and not Civil Service, which is the same now, as it has always been. As a matter of fact, a great many engineers have already entered through the engineering societies, through colleges and through various special boards in Washington. The importance, however, of a complete list of engineers and their professional specialties cannot be overrated. Such a complete list can be made only with the help of the local, as well as of the national, societies. The Committee mentioned above is organized with George J. Foran as Chairman and A. S. McAllister as Secretary. All societies should respond to the request for cooperation.

Another committee, of which Harold W. Buck is Chairman, is called the War Committee of Technical Societies. The members are Messrs. H. W. Buck, A. M. Greene, R. N. Inglis, C. R. Corning, C. C. Stone, D. W. Brunton, J. M. Boyle, J. V. Davies, Joseph Bijur, A. S. McAllister, W. D. Richardson and Charles Baskerville. It was appointed to assist any organization in Washington, such, as for instance, the Council of National Defense, the National Research Council and the Naval Consulting Board, in any way in which it can bring to the attention of the engineers of the country the necessity for thought and help in the numerous problems that arise.

A council organized by the enlargement of the present Engineering Council can be very effective in many ways, without interfering with the autonomy of any individual society. Every society has some definite purpose of its own, and also some which it holds in common with all other societies. One of the latter purposes relates to public service and to cooperation. To the end that all societies may understand fully their opportunity, the Committee, of which Mr. Foran is Chairman, has made a complete list of all the societies and their officers and communications will be sent out inviting cooperation, and it is hoped that the Council may be successful in arousing sufficient interest to bring about a larger and better Council for all engineers.

In organizing the Council provision was made for the election to membership of other national engineering and technical societies. There is no doubt that rules can be made under which these societies may become members. This will involve consultation and discussion in the future.

The office of the Council will be in the Engineering Building, 29 West 39th Street, New York City.

The members of the Engineering Council are as follows: United Engineering Society—Clemens Herschel, B. B. Thayer, I. E. Moultrop, Calvert Townley, Secretary. American Society of Civil Engineers—John F. Stevens, George F. Swain, Vice-Chairman; Fred H. Newell, Alex. C. Humphreys, John D. Galloway. American Institute of Mining Engineers—P. N. Moore, S. J. Jennings, B. B. Lawrence, J. Parke Channing, Edwin Ludlow. American Society of Mechanical Engineers—Dr. Ira N. Hollis, Chairman; John H. Barr, Charles Whiting Baker, Arthur M. Greene, Jr., Dr. D. S. Jacobus. American Institute of Electrical Engineers—H. W. Buck, Vice-Chairman; E. W. Rice, N. A. Carle, P. Junkersfeld, C. E. Skinner.

Municipal Journal

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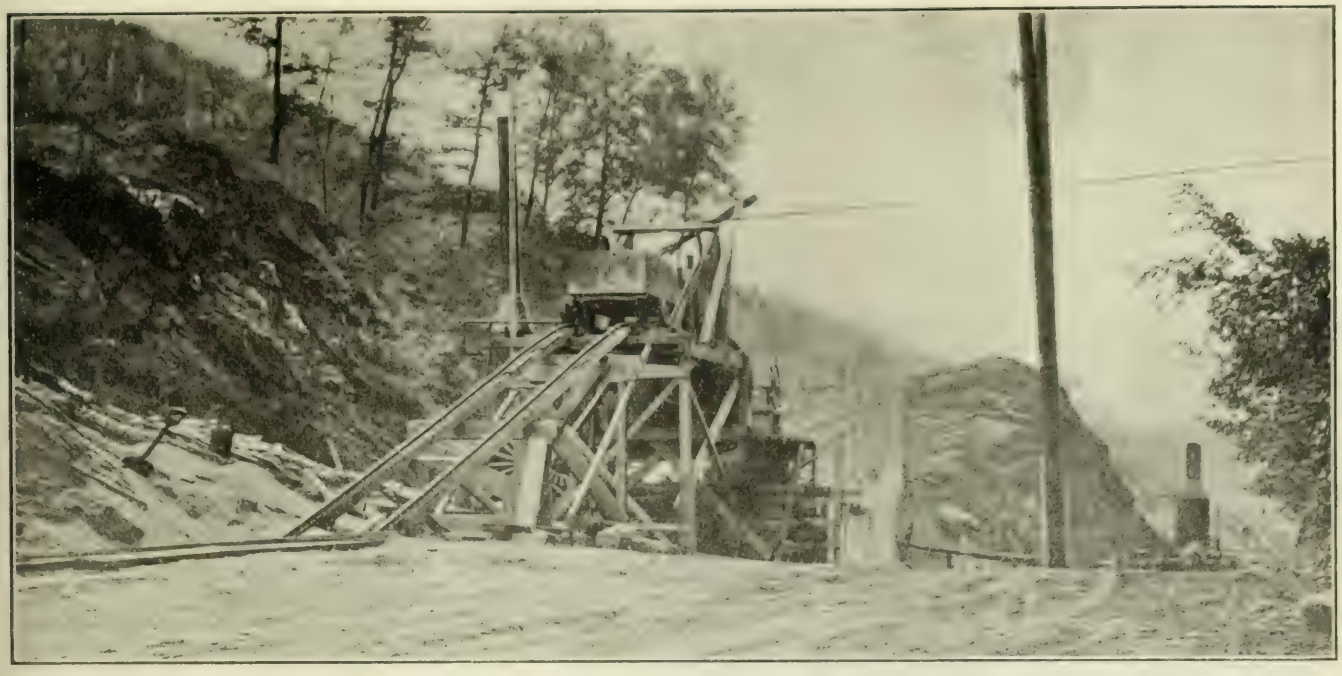
WIDENING AND STRAIGHTENING A CONNECTICUT HIGHWAY

Replacing One Grade and Two Overhead Crossings by Concrete Arch Bridge—Making a Fill While Maintaining a Way for Traffic—Steam Shovel Used in Rock Cut—Constructing Concrete Bridge.



MIXER AND MIXER CHARGING DEVICE AT BRIDGE CONCRETING PLANT, BOLTON NOTCH.

The Connecticut Highway Commission is spending nearly $45,000 on the improvement of slightly more than a mile of highway in the town of Bolton, about 15 miles from Hartford and on the main route east from that city. The work consists of new location for practically the entire distance, very heavy cuts, mostly in rock, and the substitution of one overhead crossing for one grade crossing and two bridge crossings over the railroad. All these old crossings were dangerous—the grade crossing because of its location where the railroad curves sharply out of a deep cut and the bridge crossings because of the narrowness of the bridges—about 12 feet—their high sides which cut off all view of approaching vehicles, and the right angle turns at the ends. At one end of each bridge was a drop of 20 feet to the railroad track, with only a frail guard fence as a protection in case the bridge was missed.

The present arrangement carries the road parallel to the railway for a distance of about 300 feet, substituting in this distance a 94-foot concrete bridge for the old grade crossing and eliminating the overhead crossings. This also eliminated several short, steep grades, one with a pitch of 16 per cent, and a steep approach at one of the bridges. On the relocated section, which comprises practically the entire section, the heaviest grade is 9 per cent and the curvature has been reduced greatly. About 20,000 cubic yards of rock excavation was necessary, most of which was used in fills.

The rock found at this point was chiefly a mixture of mica schist, granite and gneiss and the formations are folded and twisted to such an extent that effective blasting and handling of the rock was difficult, but excavation without blasting was impossible. In some places ledge rock was found only a foot or two above grade and this necessitated costly methods of removal. In this kind of work the usual method was drilling by means of small air-operated hand drills and blasting with light charges, afterward taking out the broken rock by hand. All air was furnished by an Ingersoll-Rand air compressor operated by a small steam engine. Air was carried through more than 2,000 feet of pipe in some cases.

In the deeper cuts (one was over 16 feet deep) the rock was blasted and then taken out by a Thew type A-1 steam shovel. This was equipped with a ⅞-yard dipper and proved very effective in handling the blasted material. The rate of removal was limited by the amount that could be hauled away, owing to the cramped space available for waste removal.

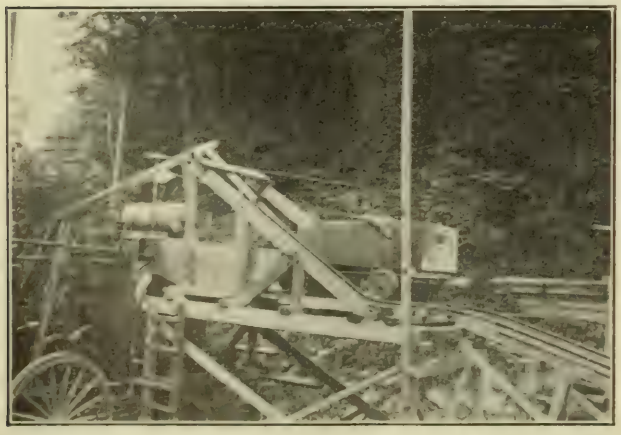
The rock obtained from the westerly cut, which was the deepest one, was used for making a large fill just below. Lack of suitable detours made it necessary to maintain an open way for traffic at all times. Owing to

CENTERING FOR 94-FOOT SPAN CONCRETE BRIDGE AT BOLTON NOTCH.

the fact that this road was the main route from Hartford east, the traffic was usually rather heavy and more or less impeded the progress of the work. On this account the fill had to be made in two parts. A Koppel track was laid along one-half of the road, mounted on a wooden trestle, and the spoil from the cut dumped from this. As one-half of the road was filled, a rough dry wall was laid up by hand in the middle, this serving to keep clear the other half of the road. While care had to be taken in dumping, this allowed the fill to be placed to its entire height without moving the track or removing or reconstructing the trestle. After the fill for the first half of the road had been completed, another trestle was built on the other half, and the fill on this completed; traffic, meanwhile, being shifted to that part of the fill already completed. This method worked well and to a large extent obviated serious delays to the heavy motor traffic.

Owing to the lack of space, the heavy grade on which

THE RAILROAD CUT BRIDGED TO ELIMINATE DANGEROUS CROSSINGS.



CHARGING CAR AND DUMP, BRIDGE CONCRETING PLANT.

the fill was being made, and the difficulty of handling a large number of construction cars, only four such cars could be used on this fill at one time—two loading while the other two were being dumped. The steam shovel loaded directly into the cars, usually filling them with about two dippers. Only a single track could be used on the narrow fill, and the nine per cent grade made it inexpedient to attempt to handle more than two loaded cars at a time. The loaded cars were let down the hill and the empties drawn up by means of a ¾-inch cable attached to a Mundy hoisting engine placed a short distance from the top of the hill. The Koppel equipment on the job consisted of about 2,000 feet of standard 24-inch, 20-pound track and four standard side-dump cars of 1½ yards capacity. The average work for one hour was 13 1½-yard cars. In 32 days on heavy cutting, where the limited space reduced the amount of material that could be handled, 3,777 of these 1½-yard cars were taken out, the total working time being 287 hours.

Next to this heavy fill and cut was several hundred feet of shallow fill which was made with rock and earth se-

GRADE CROSSING ELIMINATION, STORE AT RIGHT REMOVED AND ROAD FOLLOWS RIGHT SIDE OF RAILROAD.

cured from a couple of rather shallow fills at the other end of the job. This haul of about three-quarters of a mile was made entirely by teams, the steam shovel loading from a shallow cut, which varied in depth from 12 to 20 inches, directly into the wagons. The average load was a yard and a half, and the five teams used could not keep the shovel busy more than half the time. The average time required for the teams to make the round trip of a mile and a half was about 35 minutes, while the shovel required but two minutes to load each wagon; even less time was required in dumping. The shovel employed its spare time in gathering the earth in piles so as not to keep the wagons waiting, in moving forward, etc. Some time was lost due to traffic delays.

Some difficulty was encountered in the construction of the concrete arch bridge forms, owing to the skew of 35 degrees. This bridge has a span of 94 feet and required about 350 cubic yards of concrete and 26,000 pounds of

STEAM SHOVEL IN ROCK CUT AT BOLTON NOTCH.

reinforcement, exclusive of the abutments. It was poured n three sections, each section requiring 22 hours of con- inuous concreting. A Ransome concrete mixer was used. This was charged from overhead by a small car filled with stone and sand in their proper proportions, pulled by cable up an inclined track and dumped by means of two extra rear wheels having a wider gauge and operating on track having a steeper incline. Steady pulling on the cable raised the car from the sand and stone piles to a position over the mixer and dumped it, thus eliminating several barrow men and shovelers.

The concrete when thoroughly mixed was dumped into small concrete cars which operated on a 24-inch gauge rack laid on timbers supported by and forming part of he false-work for the forms. The cars were pushed by hand to the desired point and dumped in place. To fur- nish illumination for night work, Carbic lights were used. A section once started, work was continued until all the concrete had been poured.

ANGEROUS CONDITIONS AT OVERHEAD CROSSING.

The work includes about 20,000 cubic yards of earth nd rock excavation, classified as rock because of the oulders and ledge rock at the bottom, at $2 per cubic ard; 3,000 cubic yards of dirt fill at 75 cents per yard; 50 cubic yards of first-class concrete at $20 per yard; 300 ubic yards of second-class concrete at $18 per yard and 6,300 pounds of reinforcing steel at 6 cents per pound.

It was originally planned that only a small amount of econd-class concrete would be used for the bridge abut- ments, but the discovery of a large section of poor rock equired the use of the amount named. On account of he many fills, the first plans called for an eight-inch gravel avement, no more permanent pavement to be laid until nal settlement of the fills had taken place. About 2,200 ubic yards of gravel was required for this topping, the ontract price of which was $1 a yard. Later it was de- ded to add a 3-inch trap rock surface treated with tar. he price for this, which will require about 11,000 square ards, will be agreed upon later.

The contractors for the work are L. C. Fay & Co. of pringfield, Mass. Robert W. Stevens of Hartford is the ivision engineer in direct charge of the work. J. L. itzgerald is inspector. The total cost was approximately

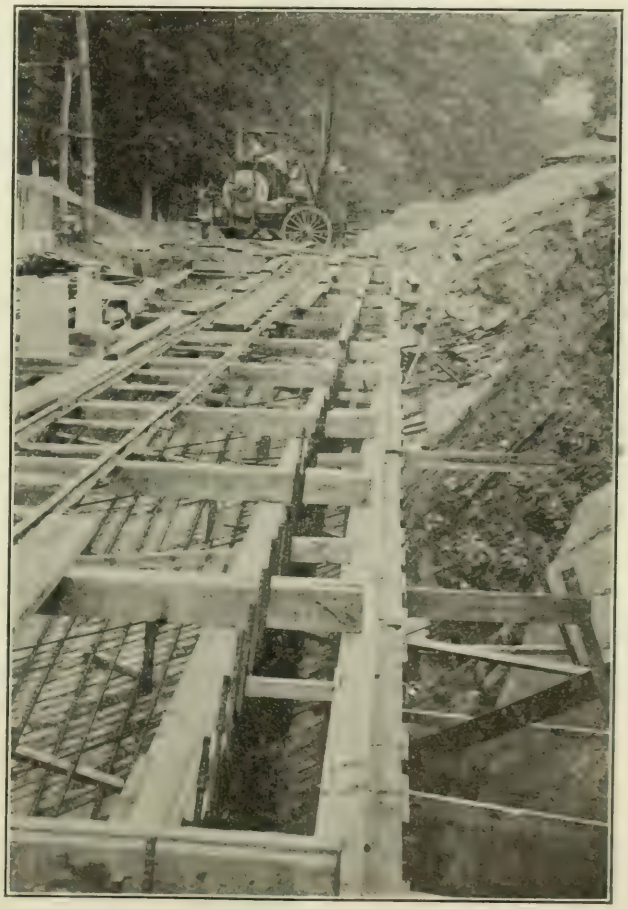
THEW SHOVEL ON LIGHT GRADING WORK.

91-FT. CONCRETE ARCH UNDER CONSTRUCTION.

$45,000, of which approximately $16,500 will be borne by the New Haven Railroad as its share toward the elimination of the grade crossing.

ROAD BUILDING IN RECORD TIME.

A record-breaking piece of road building was completed last week in connection with the army cantonment near Louisville, Ky. This is one of the few military establishments that have built permanent roads. In 63 working days the contractor completed 63,360 square yards of Trinidad asphaltic concrete highway, laid on a concrete base, or about 6 miles of road 18 feet wide. A mile of the road was over a four-foot fill, and immediately upon its completion a traffic count showed that 4,000 vehicles passed over it within the first hour. Most of these vehicles were motor trucks and wagons carrying loads of from one to five tons. The record made by the Bickel Asphalt Paving Company, the contractors, is all the more remarkable in view of the fact that it was necessary to haul and crush all the stone used on the work.



REINFORCEMENT IN PLACE, MIXING PLANT AND TRACK

MAINTENANCE OF CONCRETE PAVEMENTS

The First of a Series of Articles Explaining Practical Methods of Maintaining the Various Kinds of Pavements in General Use on Highways and City Streets.

By CHARLES CARROLL BROWN.*

The defects in concrete pavements are of several classes, due to poor materials, to poor workmanship, and to deformations in the completed concrete slab.

In the first class belong the holes caused by foreign materials in the aggregates, such as bits of wood, clay, or other materials whose forms are perishable, by scales or soft places due to dirt or collection of fine dust or sand or micaceous or other non-adhesive material. These defects are due to poor specifications for materials or to inefficient inspection of them or of the mixing of materials, and are ordinarily inexcusable. When they occur generally throughout the work and maintenance is neglected, they result in rapid disintegration of the pavement and its early failure. If such pavements are watched continuously and repairs are made promptly upon the first appearance of the defects, their life will be greatly prolonged, but at a considerable annual expense for maintenance, thus disappointing those who have been promised a pavement which will not require immediate expenditure for maintenance. Occasional defects of this sort can be taken care of by the methods of repair described below, at small cost, lengthening the life of the pavement if repairs are made promptly.

If the defects arising from these causes are allowed to grow so that they cover considerable areas or so that the edges of the holes are badly battered and shattered by the blows of traffic, no thoroughly satisfactory methods of repairing them have yet been found and it is a question of but a short time until the pavement must be torn out and replaced.

If the defective area is six or more inches in each horizontal dimension and extends nearly or quite through the thickness of the slab, it may be replaced with fair success by cutting away the concrete and refilling the hole with new concrete. There are three essentials to thorough bonding of the new concrete with the old: Vertical sides to the hole cut back to perfect concrete in the slab, thorough moistening of the old concrete without softening the sub-grade into mud, and thorough bonding of the new concrete to the old by tamping it in solidly and to uniform surface with the slab, with protection from traffic or displacement for a week or ten days until thoroughly set and bonded.

Gravel may be thoroughly tamped into the sub-grade sufficiently so that the hole in the concrete can be filled with water and allowed to stand for some hours if possible, when the gravel should be thoroughly tamped in and refilled and the concrete can be tamped into place until there is no danger of further settlement. The surface should be smoothed off to the exact level of the surrounding concrete, using a wooden float. Any thin projections from the new concrete will be quite certain to break off and if any develop it is proof that the preparation of the hole was not properly made. Perfect bonding of the old and new concrete will not be obtained unless the new concrete is of the same materials and practically the same mixture as the old. The surface must be covered with sand or earth kept moist and protected from traffic for at least a week. The many defective patches made in the general manner described are evidence of the difficulty of making them correctly or of general carelessness in making them.

*Western Editorial Representative of MUNICIPAL JOURNAL.

Occasionally a patch can be made in this way, even if the disintegration does not extend clear through the slab, but apparently there is better success with these thinner patches if they are made with bituminous concrete. As this method is used by the Ohio State Highway Department, the hole is first thoroughly cleaned of all defective concrete and dust by thoroughly sweeping, first with steel or rattan brooms and then with a house broom, followed, if convenient, with an air blast from a tire pump or other device. Vertical sides to the hole are not essential. The surface must then be painted with hot tar, such as Tarvia X, which is specially prepared for such purposes as this. The hole is then filled with bituminous concrete made with the same tar and broken stone or stone chips in proportions of about 1 part of tar to 11 parts of stone. The stone should not be larger than one-half the depth of the hole to be filled, and the hot mixture must be turned with shovels not less than six times on a platform until all particles of stone are thoroughly covered. The surface of the patch should be covered with stone screenings or coarse, dry sand (preferably the former), and it should be thoroughly compacted so that there will be no voids in the material of the patch.

If the defective areas are not deep, screenings ¼-in. to ¾-in. in size, or 3/16-in. to ½-in., according to the general run of depths, may be used. The surfaces of the areas to be patched should be thoroughly swept as above described with wire or rattan, followed by soft brooms, and by air blast if possible, and all dust and laitance of new concrete, if any, removed. The hot tar is then applied to the dry, clean concrete and rubbed in well with a squeegee or stiff broom to insure good bond with the concrete. The stone, slag, or gravel screenings are then applied. If the hot tar must be applied at the rate of more than ½-gal. a sq. yd., the patch should be applied in two coats, the excess of screenings in the first coat being brushed off before the second coat is applied. If the surface of the concrete is generally in bad condition, the same process can be used to cover the whole surface. If the precautions above stated are all adopted and the grit or screenings is spread uniformly and just sufficient in amount to incorporate with the tar, a satisfactory result will be obtained. Any prominent depressions greater than usual and any open cracks or joints should be filled by the methods given above or below before beginning the general treatment as above. The idea is to make the finished treated surface uniform and fully covered with screenings or grit so that it will be smooth for traffic. The deeper holes will be somewhat soft, probably, and piles of screenings should be at hand along the road for immediate application when warm weather softens them and brings the tar to the surface. Appearance of the tar on the surface not only produces a nuisance and damage to vehicles, but causes still greater damage to the road, and the tar must be kept covered. Ultimately, however, a concrete road requiring such treatment as that described must be replaced by an entire new surface.

Holes of very small areas can be filled with tar or with a mixture of tar and sand, and a bit of grit spead on the surface, and the patch will keep its place very well.

Tar, liquid enough to use cold, can be used in the

same manner described above, except heating, with satisfaction for the smaller holes and joints, but does not give as good results for large holes and general treatment as the heavier tars requiring heat before mixing. The cold tar becomes stiff in the mixture after a few days of exposure and gives no trouble until hot weather comes.

CRACKS AND JOINTS.

Cracks and widened joints usually occur from deformations of the concrete slabs. Contraction caused by cold opens joints and, especially if they are not protected with steel protection plates, the edges of the concrete may be broken and holes will develop. If the steel protection is too low or too high the hammering of traffic may have a similar effect.

Cracks may be longitudinal or transverse. The latter are not frequent where transverse expansion (or rather contraction) joints are properly located, but may occur from local settlement of sub-grade or other reason for the irregular support of slab, thus giving the weight of traffic an opportunity to break the slab which is thus required to act as a beam. Longitudinal cracks occur from like beam action of the concrete. Sometimes this is because the edges of the slabs are raised by the expansion of the clay sub-soil from the absorption of water along the edges of the slabs, or from the freezing of water in the sub-soil under the edges, or simply from the tendency of frost in the adjoining berm of the road to lift the concrete slab with which it is in contact. Sometimes it is because the center of the slab is lifted by some absorption of water by a badly drained sub-soil, or by the softening of the sub-soil under the edges of the slabs by water or thawing out of frozen earth, thus permitting settlement of the edges more than of the center. The sub-soil may even be washed out enough to permit such settlement. More often longitudinal cracks within the middle third of the pavement width are due to the arch of the crown. The confinement of the sides by curbs or substantial berms or even the friction of the concrete on the soil on which it rests or in which it is more or less embedded, prevents free movement outward from the center and the stress produced by the sun causes a rise of the crown and a consequent crack. The researches of the U. S. Office of Public Roads have shown that the movements necessary to produce the cracks are easily caused by the motions to which they are here attributed.

Laying the bottom of the concrete on a plane surface, giving the necessary crown to the street by thickening the concrete at the center, prevents many cracks by reducing the arch action and strengthening the concrete in the center, where the strength is most needed. Mesh reinforcement also is used to prevent the cracks from contraction and from concentration of stress on a particular line or area. If the cross section of steel is sufficient, it will be successful in the latter object. It is yet doubtful whether the distribution of the stress due to contraction over the whole area of the slab does not tend to disintegrate the concrete where the wires are embedded so that when it begins to show it spreads rapidly and requires thorough reconstruction shortly thereafter.

The cracks and spalled joints can be repaired readily with hot tar. To make a filling which will be closely adherent and therefore permanent, the joint or crack must be thoroughly cleaned, removing all dirt or other loose or foreign matter by means of an iron hook, stiff wire or rattan brooms and carefully removing the remaining dust with house brooms or compressed air, if it is available. The tar should be heated to 200 or 250 deg. F. It should not be heated too hot nor kept hot too long before using. The tar should be poured into the crack through a narrow spout so as not to spill over the surface of the slab more than enough to cover the whole of the spalled edge of crack or joint. Dry sand or coarse stone screenings must be spread immediately, enough to take up any tar which works to the surface. Before leaving a joint, it must be examined to be sure it remains full to the top, and if the tar has settled or run down or out, the joint must be filled again.

A mixture of equal parts of fine, dry sand and hot tar makes an excellent filler for block pavements and should be equally good for filling cracks and joints in concrete pavement repairing. The tar must be handled quickly, and in cool weather it may be necessary to heat the sand also.

Joint, crack, sand, and screenings must all be dry for the best results. The exact amount of sand depends on its fineness and gradation of sizes, but is never greater than half of the volume of the mixture.

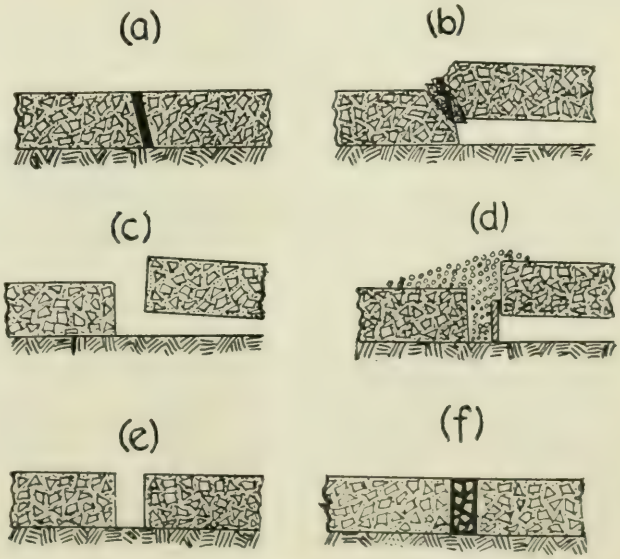
Large cracks and joints are not readily repaired. Concrete will not be permanent in the small volume required, and the tar filling may be too soft to keep its place and its consistency because the volume is too great. The following plan is recommended by the Ohio State Highway Department:

The edges of the crack or joint are first painted with tar, hot or cold, down far enough and out over the edges enough to cover all spalled and broken edges and top surfaces. The space is then filled with a bituminous concrete made of one part of a tar that is liquid at ordinary temperatures and 11 parts of stone chips of ¼-inch to ¾-inch size, thoroughly mixed, and then kept for a few days or a week, when it will be stiff enough to bind properly when tamped into a crack. The mixture should be tamped in thoroughly to the level of the adjacent surfaces and then covered with about ¼ inch of coarse grit to take up any tar working to the surface.

The Ohio department proposes the following method of bringing heaved slabs down to grade. The accompanying drawing shows the process in detail:

(a) represents a joint improperly constructed with inclined surfaces, which is one cause for heaved slabs.

(b) represents the same joint when expansion has caused the one slab to move on the other, the motion



ILLUSTRATING LOWERING RAISED PAVEMENT SLABS.

and traffic spalling off the edges of the slabs and lifting one slab above the other. The slab will probably settle back to place if the edges are cut away so that the support is taken out from under the heaved slab.

(c) represents the slabs with edges cut off for this purpose.

(d) shows these edges protected from traffic during the process of settling by a filling of gravel, kept from running under the heaved slab by a board of proper width.

(e) represents the slab settled back to place.

HAULING STONE BY TEAM.

(f) represents the enlarged joint filled with bituminous concrete as described above. If the enlarged joint is 6 inches wide or more, it may be possible to fill it with cement concrete like that used in the original pavement, without an expansion joint.

Sunken slabs can be raised by use of jacks and clayey gravel tamped under to give full bearing.

In both the above cases there is more or less danger of breaking the slabs if heavy loads run over them while they are not in full bearing.

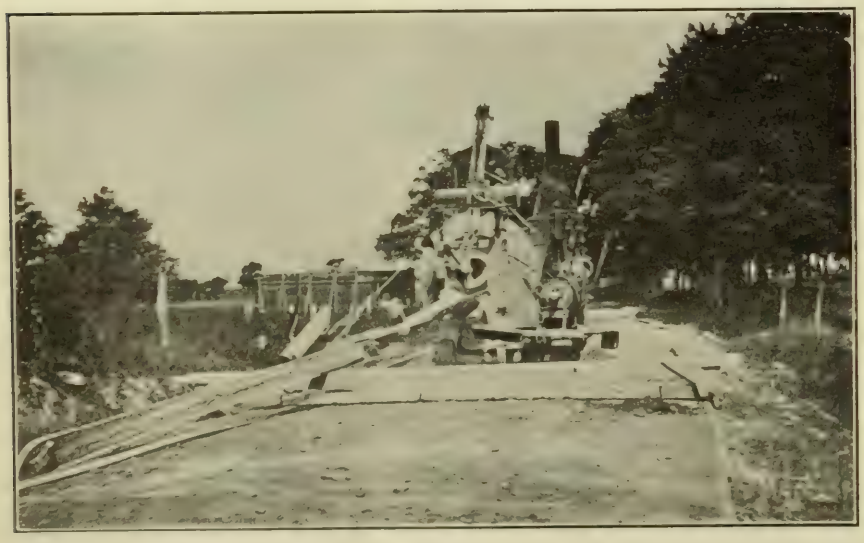
The following are suggested by the Ohio State Highway Department as necessary implements for this work: 100 gal. tar heating kettle for heating the tar, thin iron hook for cleaning the joints, 4 short-handled square point shovels, pick, 2 wheelbarrows, 3 gal. tar pouring can with conical or vertical spout, 3 gal. tar pouring can with rose (same can as above with different spout), 2 wire push brooms, house broom, concrete tamper (6 in. or 7 in.) either square or round, 2 galvanized iron pails (3 or 4 gal.), tamping iron not more than ½ in. wide.

On small jobs the tar kettle can be hauled by hand or by 1-horse wagon carrying men and tools, and the sand wheeled from piles on the roadside.

On large enough work a wagon load of sand will carry the men also and the coal and the bituminous concrete mixed ready for use, and will haul the tar kettle behind.

The Connecticut highway department uses similar methods and reports a maintenance cost of the concrete surface of $38.63 a mile a year, or 0.4 cent a square yard. Shoulder and drainage work cost $28.00 additional per mile or 0.3 cent a square yard a year. The cost of all road maintenance (much of the Connecticut system being waterbound macadam) averages $585.18 a mile or 6.25 cents a square yard a year.

In Ohio the cost of maintenance of concrete roads in 1915 for concrete surface alone was $29 a mile per year and in 1916 it was $50.



FOOTE CONCRETE MIXER ON CONCRETE PAVEMENT CONSTRUCTION.

RESURFACING AN OLD ROAD WITH CONCRETE

Machinery and Methods Used in the Reconstruction of an Old Road—Motor Trucks for Hauling Aggregates

The construction of about 7,300 feet of new concrete surface on old bituminous macadam roadway in Albany County, N. Y., which is now under way, is a rather typical job of its kind, and the methods now being employed successfully by the contractors may be of interest to those engaged in work of a similar type. The piece of road under construction is about 10 miles from Albany and three miles from the nearest railroad station, Cohoes, so that hauling sand, stone and cement over hills presented somewhat of a problem, although this was lightened by the fact that the prevailing good roads counterbalanced the rather heavy grades from the station.

The section under construction is 2.26 miles in length and the pavement is being laid 16 feet wide with one-course concrete, mixed 1:1½:3, four and three-quarter inches thick at the edges and six and three-quarter inches at the center. The bottom of the concrete section is flat and the top has a circular section. Expansion joints are placed every sixty feet. These are composed of two-ply tar roofing paper, except that every 300 feet this joint is omitted and a 1-inch tar pre-moulded joint is used in its place. The tar paper joints are placed by a rather unusual method devised by J. E. Mincher, engineer in charge for the state. The usual method is to wrap the paper around the steel joint insert, fastening it with wire to hold it in place until the insert can be removed. On this job, paper 32 inches wide is used. This is folded to give two 12-inch and one 8-inch folds, the folded paper being placed against the concrete in the shape of an L, the two 12-inch folds forming the vertical part of the letter and the 8-inch fold the base. Folded in this manner, the paper holds well to the insert without wiring, prevents dirt and concrete from getting between the flaps and insures the joint from pulling out when the steel insert is removed, as the 8-inch flap acts as an anchor.

The old road was not in bad condition and the stone in it was bound very firmly. In order to take advantage of this and secure as firm a foundation as possible, the specifications called for nothing more than a loosening and scarifying of the top part, leveling and rolling in preparation for the concrete surface. A Hvass scarifier drawn by a Kelly-Springfield 10-ton steam roller with spiked wheels was used for loosening the top surface, which was then removed by pick and shovel, redistributed to fill all depressions and inequalities

and to make a flat subgrade, and rolled thoroughly. An attempt was made to use a road scraper for this work of redistributing the material, but the stone was so firmly bound that it was ineffective. The grading gang was usually made up of ten or twelve men, but this number was increased or diminished as the men were needed on other parts of the work.

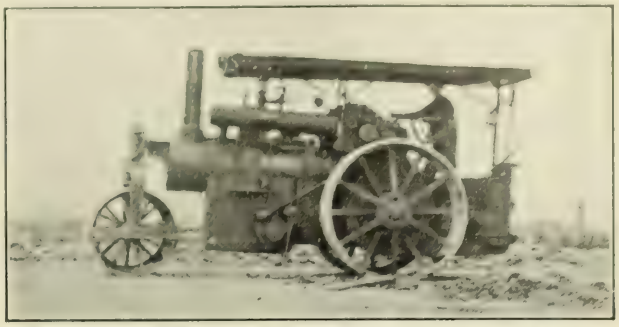
The haul varied from 2 to 4 miles, but averaged about three miles for the sand, stone and cement. Most of the hauling was done by motor trucks, but some was done by teams. The contractor owned a 5-ton Packard truck and this was used most of the time, as was a 2-ton Federal which was rented. Several teams were hired, also. The sand and stone were loaded into the trucks direct from the cars, four shovelers usually being assigned to a car. The time to load the 5-ton truck was usually about 20 to 25 minutes, the men ordinarily handling a ton of stone in 4 or 5 minutes.

No cost records were kept on the Packard truck; a rental of $12 a day was paid for the use of the Federal truck and teams were hired at the rate of $7 per day. The big truck made seven trips a day, hauling between 5 and 6 tons of sand or stone or 120 bags of cement, almost 6 tons. The 2-ton truck made eleven trips a day loaded to full capacity. The teams took two slightly over two tons per trip and made four trips a day.

On this basis the teams hauled about nine tons each per day at a cost of $7 or at the rate of 78 cents per ton delivered at the work. The 2-ton truck carried 22 tons at a cost of $12 or at the rate of 54½ cents per ton at the work. The 5-ton truck delivered forty tons a day. As stated before, no costs were kept, but it may be estimated at from $20 to $25 per day, which would make the cost about the same as that for the smaller truck and would place both trucks considerably below the cost of hauling by horses.

Traffic had to be maintained until the work of concreting had begun, so the sand and stone was dumped along one side of the road, in alternate piles. This arrangement is usually a little less handy in concreting than where the piles are on opposite sides of the road, but has the advantage that, in case the supply runs short, there is room to bring up a wagon with an additional load at any time, a thing not easy when the whole road is blocked.

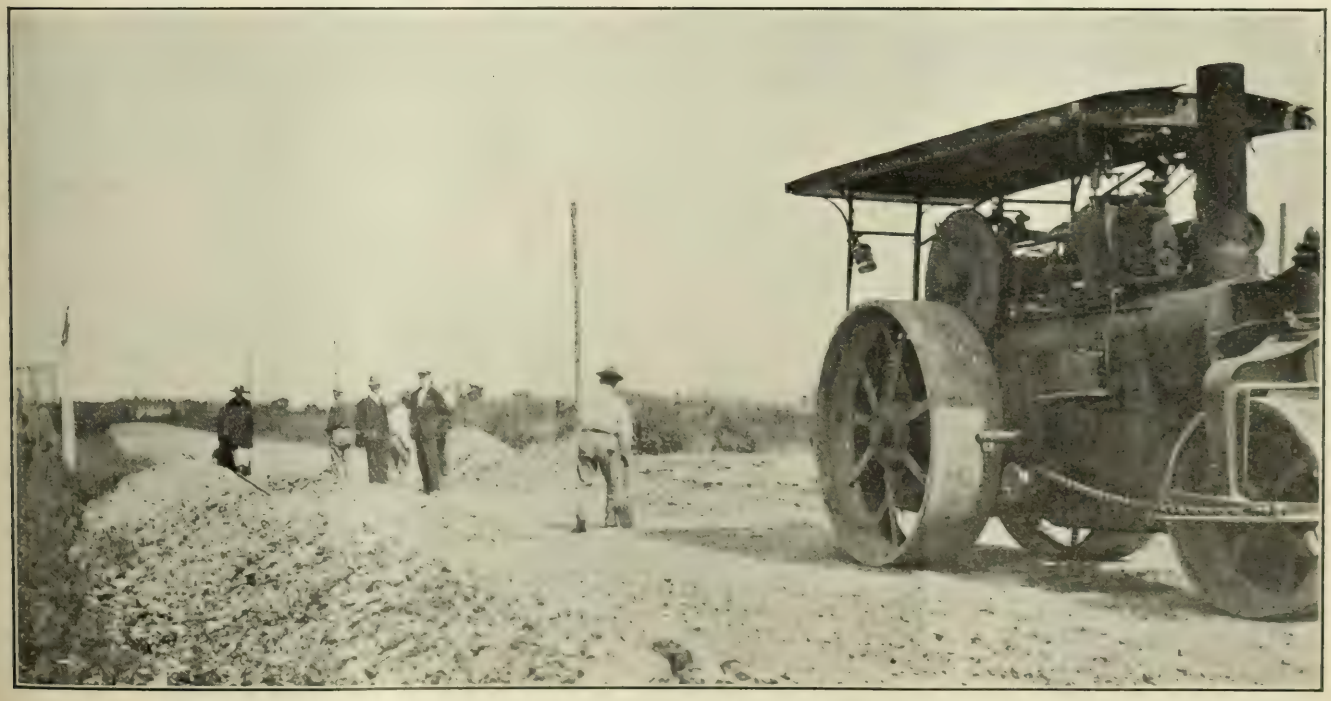
The concreting gang usually comprises about 30 men. A Foote 6A mixer, ¾-yard batch, 14 to 16 revolutions, with a chute distributor, is used. The mix of 1:1½:3 calls for 4 bags of cement, 2 barrows of sand and 4 of stone, the barrows holding three cubic feet each. The gang is made up as follows: one foreman, one engineer, one fireman, one man cleaning up around mixer and general utility, two men taking care of the forms, four men placing concrete, two men screening and handling the



KELLY-SPRINGFIELD ROLLER ON SUB-GRADE.

template, one man finishing, three men on the cement, one opening, one dumping and the other handling bags; two men wheeling sand, two men shoveling sand, four men wheeling stone, and eight men shoveling stone. Just at present the non-delivery of cement has caused a postponement of concreting work.

Water for mixing and curing the cement is secured from the Watervliet city water system. Two 1¼-inch taps were made in a 24-inch main and these connected to a 2-inch line 3,000 feet long, which is then reduced to 1½ and finally to 1 inch, this section being about 3,000 feet long. As the water in the city system has practically no head, a "Domestic" pumping unit of 3½ horse power was installed to force the water through the mains. No standpipes are used, but a safety or blow-off valve has been installed near the pump. This is set to release at about 130 pounds.



GRADING AND ROLLING IN PREPARATION FOR CONCRETING.

To surely eliminate troubles due to poor drainage, 2,995 feet of drain tile were installed along the sides of the road and under it in the form of lateral drains. Most of it was laid about a foot outside the edge of the road in a trench three feet deep. The pipe was laid with burlap joints, open, and the trenches filled with broken stone to aid in drainage. Six-inch clay pipe was used throughout.

There are several bad curves on the road. Almost all of these were banked to a greater or less extent. One reverse curve presented a serious problem. The first curve, about 200 feet long, was banked 9 inches at the highest part. The reverse part of the curve was banked 7 inches. The concrete surface was also widened on the curves, at one point from 16 to 24 feet. In laying the concrete on this section, an 8-inch straight-edge was fastened to the inside end of the template. This had the effect of throwing the center of the road toward the outside. To this was added the amount of banking.

The contractor on the work is Thomas F. Shaughnessy of Watervliet. The work is being done under the direction of H. O. Schermerhorn, division engineer for the New York Highway Department. J. E. Mincher is engineer in charge and J. Schuman is assistant engineer.

ROAD CENSUS IN IOWA.

Method and Result of Census to Secure Data Concerning Number, Weight and Class of All Vehicles and Kinds of Tires Used.

A road census has been taken at a number of points on the highways of the state of Iowa which differs from road censuses taken elswhere in at least the one particular that all of the vehicles were actually weighed. This census has been taken by the experiment station of the Engineering Department of Iowa State College, co-operating with the Iowa State Highway Commission. The purpose of the census was to secure accurate data concerning the number of vehicles using the roads; the relative numbers of vehicles classified as farm traffic, interurban, and tourist traffic respectively; the relative numbers of motor vehicles and team traffic; and the character of tires used.

In order to obtain the exact weight, rather than estimate it as is the usual practice, those taking the traffic census were provided with a set of farm scales capable of weighing any ordinary load transported over the public highways. The scales were set on one side of the road, occupying about one-half of the roadway. Each vehicle, as it passed, was signalled to stop and requested to drive onto the scales, the driver being informed of the purpose. He was also asked questions necessary to furnish the information required for filling in the blanks, viz.: whether the vehicle was in farm traffic, in interurban traffic, or was touring.

The census was taken at each point during a period of 7 days, except that 10 days were spent at one station. Figures from eight stations have already been made public and reveal some interesting and a few unexpected figures.

All of the roads on which counts were taken were dirt roads except one gravel road leading to an army cantonment. In all, the count made covered 59 days and during this time there passed over the roads 1,847 horse-drawn vehicles and 20,602 motor vehicles. This gives an average of 387 vehicles on each road per day. The number of passengers in these averaged 1,259.

As road builders estimate that under the best conditions the maximum traffic which dirt roads will sustain without undue maintenance cost is about 200 average vehicles per day, one conclusion from this census is that these dirt roads should receive a more permanent surface.

The relative number of horse-drawn and motor vehicles was one of the former to 11.2 of the latter; although the ratio varied from 1 to 1.8 on one road to 1 to 92.7 on another.

In the matter of tires there were 8.3 per cent. as many steel as rubber tires. In the matter of freight hauling, there passed the eight stations 770 motor trucks and 683 horse-drawn freight vehicles, indicating that for heavy hauling the motor vehicles were in the lead, although this was a period when large amounts of farm produce were being hauled.

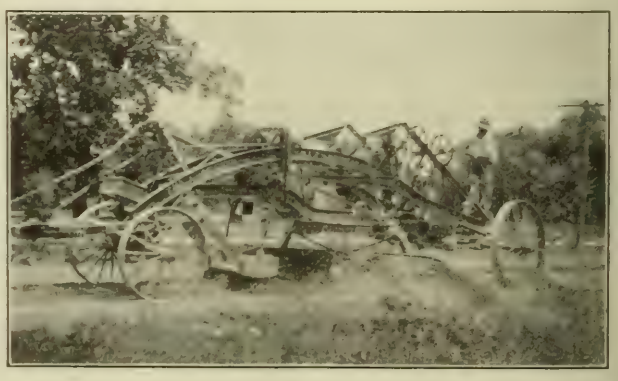
Only 290 passenger vehicles drawn by two horses were recorded, to 17,262 touring cars; and 763 one-horse passenger vehicles to 2,344 roadster motor cars. Only 145 bicycles passed all eight stations during the 59 days, and the same number of motorcycles.

The ratio between farm, interurban and tourist traffic, it was believed, should have a bearing upon the distribution of taxes for road building and maintenance. Averaging the eight stations, farm traffic constituted only 10 per cent of the total and tourist traffic only 3 per cent; and on this basis it was concluded by the investigators that 87 per cent of the cost of the highways should be borne by city, town or general state taxes rather than by farmers.

The users of the road were classified as follows: One-horse passenger, one-horse freight, 2-horse passenger, 2-horse freight, 4-horse drags, 4-horse freight, roadsters, touring cars, motor trucks, motorcycles, tractors, bicycles, saddle-horses, pedestrians, planters, hay-rakes, wagon gears, 3-horse passenger, 7-horse passenger, 25-horse machine, binder, hearse. Other data recorded were whether the vehicle was in farm, interurban, or tourist traffic, carrying freight, empty, number of passengers, carrying grain, coal, wood, hay, telegraph poles, junk, sand, cattle, merchandise, produce and oil.

REMOVING OLD MACADAM.

Just outside of the city of Chicago, in Cook County, Ill., the badly worn macadam surface of West 95th street was recently removed to make way for a concrete road surface to be covered with 2 inches of asphalt. Under the macadam the subgrade was of gravel. No grading was required on this road to prepare it for the concrete except that necessary to prepare the subgrade, but to do this it was necessary to remove from 6 to 12 inches from the old road surface. It was proposed to construct a 3-ft. macadam shoulder on each side of the 16-ft. asphalt pavement, and to use the old macadam material for constructing such shoulders.



SCARIFYING AND REMOVING OLD MACADAM AT ONE OPERATION.

The ordinary method of removing the macadam would have been to use a rooter plow or scarifier, after which the loosened material would be removed by some other method. Instead of this, the contractors, John A. McGarry & Co., of Chicago, tried out a new machine known as a "Rip Snorter," which consists of a heavy frame carrying scarifier teeth fastened in front of a scraper blade which is 9 ft. long and covers a width of road about 5 ft. when set at the angle proper for moving the material to one side. This machine both rooted up the old macadam and moved it to one side of the road at a single operation. The outfit contained, in addition, a 25 h. p. steam traction engine which was handled by two men and used to draw the Rip Snorter, and a water wagon to serve the steam tractor. This outfit removed about 10,000 cu. yds. of material in three weeks. By careful adjusting of the blade, practically no additional dressing up of the subgrade was required before the placing of the new concrete base.

APPLIANCES OWNED BY HIGHWAY AUTHORITIES.

Machinery Owned and Operated by Counties and Townships in Many States and Used for Highway Construction and Repair.

ARKANSAS. Little River County—Several drags and graders.

CALIFORNIA. Butte Co.—5 drags, 10 graders, 10 2-wheel scrapers, several dump wagons, 2 gasoline rollers, 2 scarifiers, 3 stone crushers, 10 wheelbarrows, 100 shovels.

Kings Co.—3 drags, 3 graders, 6 dump wagons, 2 scarifiers, 1 engineer's level.

San Benito Co.—road drags, graders and levelers (numbers not given), 2 2-wheel scrapers, 3 4-wheel scrapers, 2 dump wagons, 1 roller, 1 scarifier, 1 stone crusher, 1 asphalt kettle.

San Joaquin Co.—13 drags, 6 graders, 3 levelers, 8 dump wagons, 2 rollers, 13 motor trucks 5 to ¾-ton each, 3 scarifiers, 1 concrete mixer, 2 motor-driven oil spreaders and flushers, 1 2-ton asphalt kettle and 10 15-gallon asphalt kettles for patrol use, 6 wheelbarrows, 36 shovels, 3 engineer's transits, 3 engineer's levels and 1 Blaw culvert form.

CONNECTICUT. Twn. of Bloomfield—1 leveler, 1 2-wheel scraper, 1 4-wheel scraper.

Town of Clinton—1 drag, 2 4-wheel scrapers, 2 wheelbarrows, 6 shovels.

Town of Durham—4 drags and 2 graders.

Town of Eastford—2 drags, 2 4-wheel scrapers, 8 shovels.

Town of East Windsor—5 drags, 2 graders.

Town of Morris—1 drag, 2 graders.

Town of Plymouth—1 drag, 1 4-wheel scraper.

Town of Putnam—1 drag, 2 4-wheel scrapers.

Town of Southington—10 drags, 2 4-wheel scrapers.

Town of Stamford—1 drag, 1 grader, 1 4-wheel scraper, 1 steam drill, 36 wheelbarrows, 20 shovels.

Town of West Hartford—4 drags, 2 4-wheel scrapers, 1 steam roller, 1 stone crusher, 1 asphalt kettle, 1 1½-ton motor truck, 2 diaphragm pumps, 12 wheelbarrows, 1 engineer's level.

Town of Woodstock—2 drags, 1 grader, 1 2-wheel scraper, 3 4-wheel scrapers, 1 stone crusher, 3 wheelbarrows, 30 shovels, 1 engineer's instrument.

FLORIDA. Alachua Co.—2 drags, 2 graders.

Broward Co.—1 grader, 1 gasoline roller, 1 3-ton motor truck, 1 scarifier.

Calhoun Co.—2 graders, 4 2-wheel scrapers.

Lee Co.—1 grader, 1 leveler, 17 dump wagons, 1 road roller, 5 5-ton motor trucks, 1 scarifier, 1 steam shovel, 15 wheelbarrows, 30 shovels, 4 engineer's instruments.

Levy Co.—5 drags, 3 graders, 20 slat-bottom wagons, 1 road roller, 1 scarifier, 20 wheelbarrows, 80 shovels, 1 engineer's transit, 1 engineer's level.

Osceola Co.—2 drags, 2 graders, 2 engineer's instruments.

St. Lucie Co.—8 drags, 6 graders, 1 leveler, 4 drag scrapers, 4 dump wagons, 1 gasoline roller, 2 scarifiers, 1 asphalt kettle, 2 diaphragm pumps, 2 wheelbarrows, 18 shovels.

GEORGIA. Bacon Co.—1 drag, 3 graders, 1 leveler, 3 dump wagons, 60 wheelbarrows, 1 shovel.

Chattahoochee Co.—5 drags, 1 grader.

Gordon Co.—3 drags, 2 graders, 1 tractor, 1 scarifier.

Heard Co.—13 graders, 10 2-wheel scrapers, 13 4-wheel scrapers, 200 shovels.

Liberty Co.—2 drags, 1 4-wheel scraper, 36 shovels.

Lowndes Co.—2 split-log drags, 4 graders, 7 dump wagons, 1 5-ton motor truck.

Putnam Co.—10 drags, 3 4-wheel scrapers, 3 dump wagons, 1 tractor, 1 stone crusher, several shovels.

Worth Co.—12 drags, 4 graders, 1 leveler, 20 2-wheel scrapers, 2 dump wagons, 1 tractor, 3 3-ton motor trucks, 1 scarifier, 30 shovels.

INDIANA. Clinton Co.—32 drags, 25 graders, 1 scarifier, 2 engineer's instruments.

Posey Co.—10 drags, 4 graders, 2 levelers, 36 wheelbarrows, 48 shovels, 1 engineer's transit, 1 engineer's level.

IOWA. Johnson Co.—50 drags, 6 graders, 2 concrete mixers, 3 diaphragm pumps, 15 wheelbarrows.

Plymouth Co.—40 drags, 4 graders, 6 2-wheel scrapers, 1 tractor, 1 concrete mixer, 12 wheelbarrows, 40 shovels, 3 engineer's instruments.

Webster Co.—60 drags, 2 graders, 2 levelers, 22 2-wheel scrapers, 14 dump wagons, 2 tractors.

KANSAS. Sedgwick Co.—50 drags, 6 graders, 2 levelers, 10 2-wheel scrapers, 7 dump wagons, 2 tractors, 1 scarifier, 1 concrete mixer, 1 motor-driven oil spreader, 2 engineer's instruments.

KENTUCKY. Greenup Co.—12 drags, 3 graders, 10 2-wheel scrapers, 1 steam roller, 1 stone crusher, 20 shovels, 2 engineer's transits, 1 engineer's level.

LOUISIANA. Caddo Parish—10 drags, 20 graders, 15 2-wheel scrapers, 1 gasoline roller, 1 steam roller, 1 tractor, 1 1-ton motor truck, 1 5-ton motor truck, 1 6-ton motor truck, 1 scarifier, 1 motor-driven oil spreader, 2 asphalt kettles, 12 wheelbarrows, 6 dozen shovels, 4 engineer's instruments.

Catahoula Co.—2 drags, 8 graders, 1 tractor.

Morehouse Co.—4 drags, 2 graders, 1 leveler, 1 tractor, 16 shovels.

Tangipahoa Co.—10 drags, 8 graders.

MARYLAND. Baltimore Co.—5 drags, 13 graders, 10 4-wheel scrapers, 16 road rollers, 5 1-ton motor trucks, 2 scarifiers, 4 concrete mixers, 4 stone crushers, 2 motor-driven oil spreaders, 16 asphalt kettles, 2 diaphragm pumps, 1 steam drill, 50 wheelbarrows, 200 shovels, 3 engineer's instruments.

Charles Co.—9 drags, 5 graders.

Queen Anne's Co.—40 drags, 6 graders, 6 2-wheel scrapers, 20 dump wagons, 2 steam rollers, 6 wheelbarrows, 50 shovels, 1 engineer's transit, 1 engineer's level.

Talbot Co.—20 drags, 1 leveler, 5 4-wheel scrapers, 4 dump wagons, 1 steam roller, 2 scarifiers, 1 diaphragm pump, 4 wheelbarrows, 50 shovels, 1 engineer's transit, 1 engineer's level.

Wicomico Co.—25 to 50 drags, 10 graders, 12 2-wheel scrapers, 2 steam rollers, 1 asphalt kettle, 6 to 12 wheelbarrows, 24 shovels, 1 engineer's instrument, 1 set of concrete forms.

MINNESOTA. Hubbard Co.—21 drags, 1 grader, also 1 tractor and engineer's instrument, owned by the road official personally.

MISSISSIPPI. Chickasaw Co.—1 drag, 2 graders, 1 leveler, 3 dump wagons, 8 shovels.

Choctaw Co.—2 drags, 2 graders, 2 levelers.

Forrest Co.—2 drags, 2 graders, 6 2-wheel scrapers, 1 dump wagon, 1 tractor, 1 motor truck, 4 wheelbarrows.

Hancock Co.—2 drags, 2 graders, 12 shovels, 1 engineer's instrument.

Issaquena Co.—10 drags, 6 graders, 1 5-ton motor truck.

Itawamba Co.—6 drags, 2 graders.

Jackson Co.—2 drags, 3 graders, 2 tractors, 4 wheelbarrows, 6 shovels, 1 engineer's instrument.

Jones Co.—5 drags, 7 graders, 10 2-wheel scrapers, 5 dump wagons, 1 tractor, 4 motor trucks, 12 wheelbarrows, 50 shovels.

Leake Co.—2 graders.

Madison Co.—8 graders.

Oktibbeha Co.—12 drags, 2 graders, 10 two-wheel scrapers.

Pontotoc Co.—2 drags.

Sharkey Co.—30 to 40 drags, 6 graders, 2 tractors.

Simpson Co.—5 graders, 20 shovels.

Stone Co.—2 drags, 5 graders, 1 scarifier, 12 wheelbarrows, 40 shovels.

Tallahatchie Co.—8 drags, 8 graders, 1 5-ton truck.

Winston Co.—2 drags, 3 graders, a number of two-wheel scrapers, 2 tractors, 2 motor trucks.

MISSOURI. Monroe Co.—6 drags, 45 graders, 1 leveler, 6 2-wheel scrapers, 1 horse roller, 2 tractors, 3 rooter plows, 2 concrete mixers, 1 stone crusher, 1 steam drill, 10 wheelbarrows, 25 shovels, 2 engineer's instruments.

Ray Co.—100 drags, 20 graders, 2 levelers, 4 2-wheel scrapers, 2 dump wagons, 1 tractor, 2 motor trucks.

NEW JERSEY. Burlington Co.—2 levelers, 3 2-wheel scrapers, 8 4-wheel scrapers, 2 steam rollers, 1 2½-ton motor truck, 1 5-ton motor truck, 1 motor-driven oil spreader, 3 asphalt kettles, a large number of shovels.

OHIO. Defiance Co.—1 drag, 2 graders, 2 steam rollers, 3 scarifiers, 1 asphalt kettle, 5 engineer's instruments.

Gallia Co.—2 graders, 1 steam roller, 1 scarifier, 1 stone crusher, 2 wheelbarrows.

Guernsey Co.—40 drags, 20 graders, 15 2-wheel scrapers, 2 gasoline rollers, 4 scarifiers, owned by townships; also 10 rollers, 1 stone crusher, 2 asphalt kettles, 15 wheelbarrows and 40 shovels owned by county.

Madison Co.—15 drags, 10 graders, 2 engineer's transits, 1 engineer's level.

Ottawa Co.—2 engineer's transits, 3 engineer's levels.

OKLAHOMA. Jackson Co.—15 drags, 3 graders, 2 tractors, 1 engineer's transit, 1 engineer's level.

PENNSYLVANIA. Allegheny Twp.—4 drags, 3 graders, 4 shovels.

Allensville Twp.—2 dump wagons, 1 stone crusher, 4 wheelbarrows.

Amity Twp.—1 leveler, 1 scraper, 1 stone crusher, 15 shovels.

Annin—10 drags, 2 graders, 1 2-wheel scraper, 1 steam roller.

Anthony Twp.—4 drags, 2 graders, 1 set of concrete forms.

Beaver Twp.—12 drags, 1 2-wheel scraper, 3 4-wheel scrapers, 1 steam roller, 1 conc. mixer, 6 wheelbarrows, 12 shovels, 6 conc. forms.

Bedminster Twp.—6 drags, 2 4-wheel scrapers, 1 steam roller, 1 tractor, 1 stone crusher, 6 shovels, 1 conc. form.

Bell Twp.—5 drags, 2 graders.

Benton Twp.—4 drags, 4 4-wheel scrapers, 1 tractor, 12 shovels.

Berwick Twp.—1 drag.

Black Lick Twp.—6 drags, 3 graders, 1 2-wheel scraper, 3 4-wheel scrapers, 10 shovels.

Horton Twp.—20 drags, 3 graders, 2 wheelbarrows, 20 shovels, 1 conc. form.

Brush Creek Twp.—2 drags, 1 grader, 6 shovels.

Butler Twp.—4 drags, 2 graders, 1 conc. form.

Ceres Twp.—4 drags, 4 graders.

Chaneysville Twp.—2 drags, 2 wheelbarrows, 6 shovels.

Chester Twp.—2 wheelbarrows, 12 shovels, 6 rakes, 6 conc. forms.

Coburn Twp.—1 4-wheel scraper, 3 wheelbarrows, shovels and conc. form.

Cochran Mills Twp.—6 drags, 1 grader.

Conemaugh Twp.—3 drags, 1 4-wheel scraper, 1 road roller, 1 stone crusher, 2 wheelbarrows, 3 shovels.

Cowanshannoc Twp.—30 drags, 3 graders.

Danville Twp.—4 drags, 2 graders, 2 scrapers.

East Drumore Twp.—8 drags, 2 graders.

Eagles Mere Twp.—12 drags, 3 graders, 1 2-wheel scraper, 2 wheelbarrows, 10 shovels, 1 conc. form.

East Hanover Twp.—12 drags, 3 graders, 1 2-wheel scraper, 1 scarifier, 1 stone crusher, 2 wheelbarrows, 6 shovels, 4 conc. forms.

Elverson Twp.—1 drag, 1 scraper, 1 stone crusher, 6 shovels.

Endeavor Twp.—3 drags, 1 2-wheel scraper, 2 4-wheel scrapers, 4 wheelbarrows, 12 shovels.

Fairfield Twp.—3 drags, 2 graders, 1 2-wheel scraper.

Findlay Twp.—12 drags, 3 graders, 1 2-wheel scraper, 5 4-wheel scrapers.

Franklin Twp.—3 drags, 2 graders, 1 2-wheel scraper, 1 steam roller.

Frederick Twp.—3 drags, 1 grader, 1 4-wheel scraper, 1 stone crusher, 5 wheelbarrows, 8 shovels.

Fulton Twp.—25 drags, 2 graders, 3 2-wheel scrapers, 1 conc. form.

Gowen City Twp.—2 drags, 1 stone crusher, 5 wheelbarrows, 12 shovels.

Granville Twp.—10 drags, 4 graders, 1 conc. mixer, 4 wheelbarrows, 25 shovels.

Greene Twp.—8 drags, 3 graders, 1 tractor, 1 conc. mixer, 1 wheelbarrow.

Half Moon Twp.—3 drags, 1 grader, 1 2-wheel scraper, 1 4-wheel scraper, 1 stone crusher, 5 wheelbarrows.

Hanover Twp.—3 drags, 2 4-wheel scrapers.

Harbor Creek Twp.—10 drags, 5 graders, 2 2-wheel scrapers, 1 steam roller, 5 wheelbarrows, 6 shovels.

Henderson Twp.—1 grader, 1 scraper, 1 scarifier.

Henry Clay Twp.—2 graders, 1 road roller.

Hickory Twp.—9 drags, 3 graders, 1 leveler, 1 2-wheel scraper, 3 4-wheel scrapers, 1 tractor, 1 conc. form.

Horton Twp.—4 drags, 4 graders.

Independence Twp.—3 drags, 1 grader, 2 2-wheel scrapers, 2 4-wheel scrapers.

Industry Twp.—1 grader, 3 levelers.

Jackson Twp.—3 drags, 5 4-wheel scrapers, 12 shovels.

Jeffersonville Twp.—1 4-wheel scraper, 12 shovels.

Jones Twp.—3 drags, 3 graders.

Julian Twp.—4 drags, 5 shovels.

Juniata Twp.—3 drags, 1 4-wheel scraper, 1 scarifier.

Kimmell Twp.—2 drags, 2 graders, 6 shovels.

Laidig Twp.—6 drags, 1 grader, 1 leveler, 6 shovels.

Lumber Twp.—2 drags, 1 2-wheel scraper, 1 4-wheel scraper, 5 wheelbarrows, 10 shovels.

Luzerne Twp.—6 drags, 2 graders, 13 dump wagons, 4 road rollers, 2 conc. mixers, 2 stone crushers, 1 asphalt kettle, 1 steam drill, 12 wheelbarrows.

Marienville Twp.—2 drags, 2 4-wheel scrapers, 1 tractor, 6 shovels.

McHenry Twp.—2 drags, 2 graders, 10 shovels.

Milroy Twp.—6 drags, 1 4-wheel scraper, 4 dump wagons, 1 road roller, 1 stone crusher, 6 wheelbarrows, 20 shovels.

Mt. Bethel Twp.—7 drags, 3 graders, 1½ ton motor truck, 1 stone crusher, 2 dozen shovels, 2 sets concrete forms.

Neshannock Twp.—3 drags, 3 graders.

New Garden Twp.—4 drags, 2 4-wheel scrapers, 2 wheelbarrows, 12 shovels.

New London Twp.—4 drags, 1 2-wheel scraper, 2 4-wheel scrapers, 2 dump wagons.

New Wilmington Twp.—11 drags, 2 4-wheel scrapers.

Nicktown Twp.—6 drags, 3 graders, 1 leveler.

Northampton Twp.—22 drags, 2 4-wheel scrapers, 4 dump wagons, 1 steam roller, 2 wheelbarrows, 12 shovels, 1 set of conc. forms.

North Towanda Twp.—1 drag, 2 4-wheel scrapers.

Ontelaunee Twp.—1 drag, 1 leveler, 1 4-wheel scraper, 1 stone crusher, 6 wheelbarrows, 6 shovels.

Patton Twp.—2 drags, 1 grader, 1 scarifier, 1 stone crusher, 6 wheelbarrows, 12 shovels.

Perry Twp.—3 drags, 2 graders.

Philipsburg Twp.—3 drags, 2 4-wheel scrapers, 12 shovels.

Pillow Twp.—4 drags, 1 4-wheel scraper, 1 stone crusher, 4 wheelbarrows, 1 concrete form.

Pine Creek Twp.—2 drags, 1 scraper, 4 wheelbarrows, 6 shovels.

Plum Creek Twp.—20 drags, 4 graders.

Plumstead Twp.—12 drags, 2 graders, 1 steam roller, 1 stone crusher.

Plymouth Twp.—1 stone crusher.

Portage Twp.—1 drag, 1 grader.

Rebersburg Twp.—1 drag, 1 grader, 1 4-wheel scraper, 1 steam roller, 1 tractor, 1 scarifier, 1 stone crusher.

Rockfeller Twp.—6 drags, 1 4-wheel scraper, 1 stone crusher, 1 wheelbarrow, 12 shovels.

Rush Twp.—4 drags, 3 4-wheel scrapers.

Salem Twp.—5 drags, 2 graders, 1 2-wheel scraper.

Salisbury Twp.—8 drags, 2 graders, 2 levelers, 2 4-wheel scrapers, 1 road roller, 1 stone crusher, 1 diaphragm pump, 5 wheelbarrows, 25 shovels, 2 conc. forms.

Saltlick Twp.—1 drag, 1 grader, 1 4-wheel scraper, 1 steam roller.

Sandy Creek Twp.—10 drags, 2 graders.

Sandy Lake Twp.—20 drags, 3 graders, 4 2-wheel scrapers.

Sinnamahoning Twp.—3 drags, 2 scrapers, 1 wheelbarrow, 12 shovels.

Slippery Rock Twp.—6 drags, 3 graders, 3 levelers, 2 wheelbarrows, 6 shovels, 2,000 feet concrete forms.

Snyder Twp.—3 drags, 1 grader, 1 leveler, 1 2-wheel scraper, 3 dump wagons.

Sparta Twp.—6 drags, 5 graders, 1 2-wheel scraper, 1 tractor, 3 wheelbarrows, 12 shovels, 3 sets of wood conc. forms.

Spring Twp.—12 drags, 6 graders, 4 2-wheel scrapers, 6 4-wheel scrapers, 6 wheelbarrows.

St. Boniface Twp.—4 drags, 1 grader.

Stillwater Twp.—2 drags, 1 grader, 1 2-wheel scraper.

Summit Twp.—3 drags, 4 graders, 1 2-wheel scraper.

Susquehanna Twp.—1 drag, 1 grader.

Thornbury Twp.—2 drags, 1 grader, 2 levelers, 4 4-wheel scrapers, 4 shovels.

Transfer Twp.—3 drags.

Tyrone Twp.—4 drags, 1 grader, 2 dump wagons, 1 road roller, 1 scarifier, 2 stone crushers, 1 steam drill, 3 wheelbarrows, 12 shovels.

Ulster Twp.—3 drags, 3 graders, 6 shovels.

Union Twp.—1 drag, 2 2-wheel scrapers, 2 4-wheel scrapers, 13 shovels.

Upper Chichester Twp.—2 drags, 1 grader, 1 stone crusher, 20 shovels.

Upper Unchland Twp.—3 drags, 2 graders.

Wallace Twp.—2 drags, 1 grader.

Washington Twp.—16 drags, 2 graders, 6 shovels.

Waterford Twp.—15 drags, 6 graders, 2 2-wheel scrapers, 1 steam roller, 1 conc. mixer, 2 wheelbarrows.

Waterville Twp.—2 drags, 1 grader, 6 shovels.

Wayne Twp.—13 drags, 3 graders.

Weisenburg Twp.—8 drags, 2 graders, 1 stone crusher.

Wells Twp.—3 drags, 3 graders, 3 levelers, 6 bail scrapers.

West Burlington Twp.—6 drags, 1 grader.

West Farmington Twp.—10 drags, 1 2-wheel scraper, 10 shovels.

West Mead Twp.—12 drags, 4 graders, 1 2-wheel scraper, 12 shovels.

Whiteley Twp.—6 drags, 4 graders.

Willistown Twp.—1 grader, 6 dump wagons, 1 steam roller, 5 wheelbarrows, 30 shovels.

Winfield Twp.—12 drags, 1 grader, 3 4-wheel scrapers, 2 doz. shovels.

Young Twp. (Jefferson County)—3 drags, 3 graders, 3 levelers.

Young Twp. (Indiana County)—8 drags, 2 graders, 1 4-wheel scraper, 3 dump wagons, 3 wheelbarrows, 20 shovels.

SOUTH CAROLINA. Cherokee Co.—18 drags, 6 graders, 10 2-wheel scrapers, 1 scarifier, 12 wheelbarrows, 3 doz. shovels.

Marlboro Co.—12 drags, 5 graders, 1 scarifier, 12 wheelbarrows, 100 shovels.

TENNESSEE. Carroll Co.—12 drags, 100 graders, 12 wheelbarrows.

Madison Co.—57 drags, 13 graders, 30 levelers, 10 wagons, 1 scarifier, 100 shovels, 1 engineer's transit, 1 engineer's level, 1 conc. bridge form.

TEXAS. Armstrong Co.—12 drags, 3 graders, 1 leveler, 1 tractor.

Briscoe Co.—2 graders.

Brown Co.—40 drags, 6 graders, 20 two-wheel scrapers, 1 road roller, 1 scarifier, 12 wheelbarrows.

Castro Co.—4 drags, 1 grader.

Chambers Co.—2 drags, 2 graders, 2 tractors.

Culberson Co.—2 drags, 2 graders, 1 tractor, 1 conc. mixer.

Dallas Co.—50 drags, 15 graders, 3 steam rollers, 1 tractor, 2 scarifiers, 50 wheelbarrows, 150 shovels, 4 engineer's instruments.

Deaf Smith Co.—20 drags, 4 graders, 3 2-wheel scrapers, 2 tractors, 3 engineer's instruments.

Dimmit Co.—8 drags, 4 graders, 3 2-wheel scrapers.

El Paso Co.—16 drags, 3 graders, 2 levelers, 12 dump wagons, 2 road rollers, 1 conc. mixer, 2 asphalt kettles, 8 wheelbarrows.

Frio Co.—4 drags, 4 graders, 6 2-wheel scrapers, 2 tractors, 6 wheelbarrows, 12 shovels.

Gillespie Co.—40 drags, 10 graders, 4 2-wheel scrapers, 8 dump wagons, 1 gasoline roller, 1 tractor, 1 scarifier, 200 shovels.

Haskell Co.—45 drags, 8 graders, 6 2-wheel scrapers.

Hunt Co.—40 drags, 5 graders, 3 tractors, 3 motor trucks.

Jim Wells Co.—20 drags, 4 graders, 1 road roller, 1 tractor, 10 wheelbarrows.

Jones Co.—12 drags, 12 graders, 6 2-wheel scrapers, 6 wheelbarrows.

Lipscomb Co.—8 drags, 7 graders.

Live Oak Co.—4 drags, 4 graders, 6 2-wheel scrapers.

Lubbock Co.—8 drags, 2 graders.

Madison Co.—5 drags, 5 graders, 5 Fresno scrapers, 50 slip scrapers.

Marion Co.—6 drags, 3 graders.

Martin Co.—1 drag, 1 grader.

Moore Co.—2 drags, 1 grader.

Ochiltree Co.—10 drags, 4 graders, 6 shovels.

Shelby Co.—6 drags, 8 graders, 6 2-wheel scrapers, 3 tractors.

Stonewall Co.—15 drags, 6 graders, 12 2-wheel scrapers.

Taylor Co.—30 drags, 5 graders, 8 2-wheel scrapers, 4 dump wagons, 1 steam roller, 2 wheelbarrows, 24 shovels, 1 set of conc. forms.

Tyler Co.—12 drags, 3 graders, 2 levelers, 8 2-wheel scrapers.

Val Verde Co.—6 drags, 3 graders, 1 tractor, 1 stone crusher.

Zavalla Co.—4 drags, 4 graders, 16 rollers.

VIRGINIA. Halifax Co.—14 drags, 7 graders, 20 2-wheel scrapers, 1 diaphragm pump, 6 wheelbarrows, 100 shovels, 1 engineer's level.

WASHINGTON. Douglas Co.—20 drags, 10 graders, 15 2-wheel scrapers, 10 dump wagons, 1 stone crusher, 50 shovels, 2 engineer's transits, 1 level.

Pierce Co.—8 drags, 5 graders, 8 2-wheel scrapers, 8 dump wagons, 1 road roller, 2 tractors, 3 motor trucks, 3 to 5 tons, 1 scarifier, 2 conc. mixers, 2 stone crushers, 1 steam shovel, 1 asphalt kettle, 6 industrial cars, 20 wheelbarrows, 60 shovels, 3 engineer's transits, 3 levels.

Snohomish Co.—25 drags, 3 graders, 6 2-wheel scrapers, 10 dump wagons, 2 steam rollers, 1 tractor, 1 5-ton motor truck, 1 scarifier, 1 stone crusher, 1 asphalt kettle, 20 wheelbarrows, 50 shovels, 4 engineer's transits, 7 levels.

Skamania Co.—10 drags, 5 graders, 20 2-wheel scrapers, 2 road rollers, 3 stone crushers, 2 engineer's instruments.

WEST VIRGINIA. Raleigh Co.—1 3-ton motor truck and 1 5-ton truck, 8 engineer's instruments.

WISCONSIN. Trempealeau Co.—120 drags, 30 graders, 2 levelers, 50 2-wheel scrapers, 3 dump wagons, 3 road rollers, 74 shovels, 2 engineer's instruments.

TOWN AND COUNTY HIGHWAY DATA

Data Concerning Town and County Road Construction in Many of the States—Amount of Work Done and Types of Roads Built—Construction Details and Costs—Surface Treatment.

The following information concerning town and county road work has been furnished to Municipal Journal by the town and county highway officials. The information is, in a way, supplementary to that concerning state and county work given in the April 5th issue of Municipal Journal, but in the present number especial attention has been paid to highway work done in the smaller political divisions of those states where road work, owing to favorable weather, can be carried on during all or most of the year. Information is also included from those counties in the northern states which, at the time the information for the State and County Road Number was being collected, had not yet made their plans for the season. Also, a special effort was made to get information from Connecticut and Pennsylvania, where practically all the work not done by the state comes under the direction of the township officials. Under Pennsylvania and Connecticut, therefore, the information given relates to the work done in the various townships. A great many townships informed us that no work had been done by them this year, and their names do not appear in the table or list of appliances owned.

TABLE NO. 1-A—AMOUNT OF HIGHWAY BUILT DURING 1917.

Including work now under way. Amounts are in miles or square yards—the size of each number indicates which.

State and County.	Brick				Concrete					Bituminous Concrete			Bitulithic	
	Am't.	Width.	Depth of Cushion.	Kind of Filler.	Am't.	Width.	One or 2-course.	Total thickness.	Reinforced?	Am't.	Width.	Thickness.	Am't.	Width.
California:														
Contra Costa	....	....	....	....	31C	18	1	5	Partly	....	....	....	....	....
San Joaquin	....	....	....	....	....	..	..	..	....	....	....	....	1	16&24
Santa Clara	3,378C	18	None	Grout	93,358C	18	1a	4	None	....	....	....	....	....
Ventura	....	....	....	....	{ 62.1	16	1	4	None	....	....	....	....	....
					{ 11.1	18	..	..	....	....	....	....	....	....
Connecticut:														
Clinton	....	....	....	....	0.25C	24	..	..	....	....	....	....	....	....
Plymouth	....	....	....	....	1.0D	18	..	..	....	1.0	....	2	....	....
Wallingford	....	....	....	....	....	33	1	..	....	....	....	....	....	....
Florida:														
Osceola	4.5	9	....	....	....	..	..	..	....	....	....	....	....	....
St. Lucie	....	....	....	....	....	..	..	..	....	25C	16&9	9	....	....
Maryland:														
Baltimore	....	....	....	....	15	15to42	1	6	None	....	....	....	....	....
Queen Anne's	....	....	....	....	32,035C	14	1	7&5	None	....	....	....	....	....
Talbot	....	....	....	....	7	15	..	6	None	....	....	....	....	....
Mississippi:														
Pontotoc	40	14	....	....	....	..	..	..	....	....	....	....	....	....
New Jersey:														
Burlington	....	....	....	....	2	18	1	7	....	....	....	....	....	....
Ohio:														
Defiance	....	....	....	....	{ 4.0	15	1	7	Yes	....	....	....	....	....
					{ 5.5	15	1	7	None	....	....	....	....	....
Guernsey	7C	16	6	Grout	....	..	..	..	....	....	....	....	....	....
Oklahoma:														
Jackson	....	....	....	....	....	..	..	..	....	....	....	....	12,243C	70
Madison	4,515C	36	2	Grout	....	..	..	..	....	....	....	....	....	....
Ottawa	1.0D	16&20	1½	Mastic	0.75C	..	1	6&8	Yes	....	....	....	....	....
Pennsylvania:														
Luzerne	12	14	1	....	....	..	..	..	....	....	....	....	....	....
New Wilm'gton	....	....	....	....	2.5C	16	..	..	....	....	....	....	....	....
Salisbury	....	....	....	....	....	..	..	..	....	2D	8	6	....	....
Thornbury	0.12	14	....	....	....	..	..	..	....	....	....	....	....	....
Texas:														
Dallas	....	....	....	....	6.5C	16,18&20	2	6¾	Yes	....	....	....	....	....
El Paso	....	....	....	....	15C	18	1	7	None	....	....	....	21C	16
Hunt	40	8&14	....	....	....	..	..	..	....	....	....	....	....	....
Washington:														
Pierce	0.744C	16	1½	Sand	24.28CD	16&17	1	5to8	None	6.06C	17	1b	19.21C	16&17
Snohomish	....	....	....	....	65C	9&16	1	5to7	In low spots	....	....	....	....	....

a, With 1½ in. Topeka top; b, 1-in. top on 5-in. base; c, by contract; d, by department.

Municipal Journal

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Contributed Articles and Reports.

Contributions suitable for this paper, either in the form of special articles or as letters discussing municipal matters, are invited and paid for.

City officials and civic organizations are particularly requested to send Municipal Journal regularly their annual and special reports.

Information Bureau.

Municipal Journal's Information Bureau, developed by twenty-one years' research and practical experience in its special field, is at the command of our subscribers at all times and without charge.

COST-PLUS-PERCENTAGE CONTRACTS.

Attention has been called time and again to the extreme probability that a municipality which includes uncertainties or risks in a contract will be required by the contractor to pay a premium on these in the contract prices. In other words, no sensible contractor who knows his business will assume unusual risks in a contract without adding a sufficient amount to the price to adequately protect himself in the risk. It is therefore generally advisable for cities to assume such risks themselves as far as possible, as this will generally be cheaper in the long run and will make the contract attractive to a larger number of bidders.

At the present time there is an unusual risk in most contract work caused by uncertainties of prices for material, of wages, and of the ability to obtain labor in the desired quantities. A number of cities, counties and states have recognized this as being an unusual risk and therefore subject to the objections attached to such when embodied in contracts, and have eliminated them from their contracts so far as possible. The method ordinarily employed for so eliminating them is to arrange for having work done on the cost-plus-percentage basis. By far the largest contracts let recently on this plan have been for the army cantonments, all of which were let by the government on this basis. The advisability of arranging for highway and other construction work to be done along the same lines is suggested as worthy of serious consideration. For many years road work has been carried on in Los Angeles County, California, by such a method, termed there "Force Account Contracts"; the county furnishes all the material and carries all the labor on its payrolls, while the contractor furnishes the equipment and management.

In making such arrangements for work it is important to consider not only the ability of the contractor to do work in an acceptable manner and at reasonable cost, but also his honesty and the probability that he will use his best endeavors to keep the cost as low as possible even though doing so is not to his immediate financial advantage. On this point the road commissioner of Los Angeles County, H. F. Joyner, said recently: "It is my experience that the character and ability of the contractor and also of the road commissioner or highway engineer appointed by the county to look after its interests are of greater importance than the exact form or wording of the contract. An honest, capable contractor and an honest, capable engineer will construct a good, honest, economical highway, regardless of many of the details of the contract; while if the contractor and engineer are dishonest or incapable, the roads will be poorly and expensively constructed, regardless of the requirements of the signed contract."

To contractors we suggest that they consider well the desirability of establishing a reputation for keeping the cost of work at a minimum when performed by them on the cost-plus-percentage basis. There will probably be considerable work done in this way in the future, even though prices and labor conditions become more settled; and aside from this, such a reputation is likely to give to those employing the contractor a confidence in his essential honesty and a desire to have further business dealings with him, even though he may not always be the lowest bidder on the basis of the itemized bids received at future lettings. Although there are still too few municipal officials who realize that some contractors are honest and that such honesty is as valuable an element in dealing with them as in dealing with any other business man, still, the truth of this is gradually being learned and we hope that appreciation of it will rapidly become general.

LABOR AVAILABLE FOR ROAD WORK.

The number of laborers is insufficient to meet the unusual demands in most sections of the country at present, and yet there are thousands of able-bodied men who are doing no useful work, and are prevented from doing so by local or federal government. It would certainly seem as though the authorities, instead of maintaining them in idleness at the expense of the taxpayers, should utilize their labor in the most effective way possible. Several states have done considerable along this line, but the use of convicts is not nearly so extensive and general as it might be. Road construction, including quarrying stone for this purpose, seems to offer the best avenue for the use of unskilled labor and even of several classes of skilled labor; partly, at least, because it is least objectionable to labor unions, since it involves minimum competition with free labor.

The successful use of convicts on California road work has been reported from time to time, but some definite figures of the economies attained by such work have recently been made public by Charles F. Stern, one of the state highway commissioners. About 33 miles of difficult mountain road have been finished recently in Mendocino county. The engineers estimated that the work would cost from $335,000 to $400,000; it was completed for $200,000. The grading required the removal of about 200,000 yards of material, over half of it rock, which the engineers figured would cost about 40 cents a yard to handle. Convict labor cut that cost nearly in half. In reaching the actual costs, every item of expense is included, clothing, transportation, food, camp equip-

ment and medical attention. The cost of guarding is not included, for the reason that in California the convict road camps are honor camps, and the representatives of the prison authorities are unarmed, their duties being supervisory. The men are treated like free laborers, on and off duty, and the result of this policy was summed up by Mr. Stern as follows: "Unquestionably this system, sanely and sympathetically handled, means the building of many hundreds of miles of roads that could not otherwise be built, at a saving of many thousands of dollars in the cost of construction."

Missouri has recently joined the list of states that use convicts in road work. For some years she has had laws that authorized this, but has failed to put her prisoners at work which will yield an offset to the state for their expense, and at the same time keep them in good physical condition at tasks which are interesting to most men. Now, however, the State Prison Board and the new State Highway Department have arranged for working as many as 500 of these convicts on the highways. They will be used on the county roads and the counties must pay the state for their services, food, lodging and guarding, but the total cost is not expected to exceed $1.50 per convict per day. The work done will be under the general supervision of the State Highway Department, which will thus have an opportunity of studying the conditions which make such labor efficient or inefficient and will be able to develop the best methods for use in Missouri. This is an important matter, because experience shows that the methods by which convicts can be employed to advantage in one section of the country are not necessarily those best adapted for another section. It is very desirable to have the early stages of such work carefully supervised, because in convict labor lies one of the most important means of carrying on road work at this time, when free labor is scarce, and any mistakes in administration and management should be corrected as soon as discovered. Delay in remedying mistakes has been responsible for some of the unsatisfactory results of convict road work in northern states, where conditions were allowed to remain poor until everybody connected with the experiments was discouraged with them.

TABLE NO. 1-B—AMOUNT OF HIGHWAY BUILT DURING 1917.

Including work now under way. Amounts are in miles or square yards—the size of each number indicates which.

	Warrenite		Bituminous macadam			Water-bound macadam			Gravel			Sand-clay		Earth	
State and County.	Am't	Width	Am't	Width	Thick-ness	Am't	Width	Thick-ness	Am't	Width	Thick-ness	Am't	Width	Am't	Width
California:															
Butte	....	....	....	....	....	20	16&18	....	15	12&15	....	10	....	....	....
Monterey	....	....	8D	15	6	....	....	....	....	....	....	....	....	....	....
San Benito	....	....	....	....	....	....	....	....	6	14	....	....	....	....	....
San Joaquin	....	....	25	12	....	....	....	....	12D	12	....	....	....	....	....
Ventura	6	16&20	....	....	....	....	....	....	....	....	....	....	....	6	20to24
Connecticut:															
Bloomfield	....	....	....	....	....	4,000C	....	....	....	....	....	....	....	....	....
Clinton	....	....	....	....	....	6	15	....	....	....	....	....	....	....	....
Plymouth	....	....	....	....	....	....	....	....	....	....	....	....	....	100	....
Southington	5	....	....	....	....	10	....	6	....	....	....	....	....	125	....
Stamford	....	....	....	....	....	7	18	....	....	....	....	....	....	....	....
West Hartford	....	....	....	....	....	16,000D	18	....	....	....	....	....	....	....	....
Wethersfield	....	....	1	16	2	....	....	....	....	....	....	....	....	....	....
Florida:															
Alachua	....	....	....	....	....	....	....	....	....	....	....	9	....	10	....
Broward	....	....	....	....	....	470,000C	9to30	....	....	....	....	....	....	....	....
Calhoun	....	....	....	....	....	....	....	....	....	....	....	....	....	50	30
Lee	....	....	....	....	....	....	....	....	....	....	....	192C[a]	9to15	....	....
												106C[a]	15to24	....	....
Levy	....	....	....	....	....	....	....	7	2C[b]	10		25C	9	18D	....
Osceola	....	....	....	....	....	C	9	....	....	....	....	....	....	11	....
Palm Beach	....	....	60c	15	5	c	3	....	....	....	....	....	....	....	....
St. Lucie	....	....	....	....	....	....	....	....	....	....	....	20C&D	9	100D	....
Georgia:															
Bacon	....	....	....	....	....	....	....	....	....	....	....	10	....	....	....
Chattahoochie	....	....	....	....	....	....	....	....	....	....	....	8C	30	....	....
Liberty	....	....	....	....	....	....	....	....	....	....	....	25	14to20	....	....
Lowndes	....	....	....	....	....	....	....	....	....	....	....	125D	30	....	....
Worth	....	....	....	....	....	....	....	....	....	....	....	72[d]	....	....	....
Indiana:															
Clinton	....	....	....	....	....	....	....	....	11.44	9	12	....	....	....	....
Posey	....	....	....	....	....	7½C	10	10&12	19C	10	8&12	....	....	....	....
Iowa:															
Johnson	....	....	....	....	....	....	....	....	....	....	....	....	....	33D	....
Webster	....	....	....	....	....	....	....	....	....	....	....	....	....	80C&D	....
Kentucky:															
Carter	....	....	....	....	....	10	16	9	....	....	....	....	....	....	....
Greenup	....	....	....	....	....	2C	14	8	....	....	....	2C	22	40C	22
Louisianna:															
Caddo	....	....	....	....	....	....	....	....	20	16	8	....	....	10	....
Catahoula	....	....	....	....	....	....	....	....	....	....	....	....	....	175	....
Morehouse	....	....	....	....	....	....	....	....	....	....	....	....	....	93D	....
Tangipahoa	....	....	....	....	....	....	....	....	36	14	4to8	....	....	....	....
Maryland:															
Baltimore	....	....	5	16to30	6	25	16	6	....	....	....	....	....	....	....
Charles	....	....	....	....	....	....	....	....	30,051C	10	8	....	....	....	....
Queen Anne's	....	....	....	....	....	10.65C	12	7	....	....	....	....	....	....	....
Talbot	....	....	....	....	....	....	....	....	....	....	....	....	....	200	24
Wicomico	....	....	....	....	....	....	....	....	....	....	....	....	....	100D	24to30
Minnesota:															
Hubbard	....	....	....	....	....	....	....	....	....	....	....	....	....	5C	20to24
Mississippi:															
Forrest	....	....	....	....	....	....	....	....	6C	12	....	10C	12	400C	16to30
Chickasaw	....	....	....	....	....	....	....	....	28C	12	6	....	....	58	....
Choctaw	....	....	....	....	....	....	....	....	....	....	....	2	....	38	20&16
Hancock	....	....	....	....	....	....	....	....	17.48[e]	14	8	....	....	225	24
Holmes	....	....	....	....	....	....	....	....	90C	12to14	8	60C	....	....	....
Itawamba	....	....	....	....	....	....	....	....	26	....	4	....	....	....	....
Jackson	....	....	....	....	....	....	....	....	5C[e]	20	....	....	....	2C	16
Jones	....	....	....	....	....	....	....	....	10	16	9	....	....	125	16to24
Leake	....	....	....	....	....	....	....	....	....	....	....	30C	20	....	....
Madison	....	....	....	....	....	....	....	....	96C	12	....	37C	12	....	....
Newton	....	....	....	....	....	....	....	....	22	8to16	....	12	18to24	....	....
Oktibbeha	....	....	25,000C	16	8	61C	12	8	....	....	....	....	....	....	....
Pontotoc	....	....	....	....	....	....	....	....	6C	12	9	....	....	90C	....
Simpson	....	....	....	....	....	....	....	....	52	20	8	....	....	5	....
Sharkey	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Tallahatchie	....	....	....	....	....	....	....	....	10	10	8	....	....	500	20
Union	....	....	....	....	....	....	....	....	28[f]	15	6	....	....	....	....
Winston	....	....	....	....	....	....	....	....	....	....	....	200	18	....	....

TABLE NO. 1-B—AMOUNT OF HIGHWAY BUILT DURING 1917.

State and County.	Warrenite		Bituminous macadam			Water-bound macadam			Gravel			Sand-clay		Earth	
	Am't.	Width.	Am't.	Width	Thickness	Am't	Width	Thickness	Am't	Width	Thickness	Am't	Width	Am't	Width
Missouri:															
Monroe	....	....	....	....	....	....	....	....	....	....	....	....	....	12.5	24
Ray	....	....	....	....	....	....	....	....	....	....	....	800	....	15	....
New Jersey:															
Burlington	....	....	....	....	....	10	14	6	10	20	8	....	....	....	....
New York:															
Yates	....	....	....	....	....	9½	12	....	....	....	....	....	....	....	....
Ohio:															
Defiance	....	....	2	16	7	31	14&16	7	7	12	10	....	....	....	....
Gallia	....	....	....	....	....	2.19C	14	4	....	....	....	....	....	....	....
Guernsey	....	....	2C	16	....	....	....	....	....	....	....	....	....	14.5D	26
Madison	....	....	....	....	....	1.7	10	8	....	....	....	....	....	....	....
Ottawa	....	....	....	....	....	1.19C	10	8	....	....	....	....	....	....	....
						1.11C	14	8	....	....	....	....	....	....	....
Oklahoma:						1.16	16	8	....	....	....	....	....	....	....
Jackson	....	....	....	....	....	....	....	....	....	....	....	7	16	50	32
Pennsylvania:															
Allensville	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Amity	....	....	....	....	....	....	....	....	....	9	3to6	....	....	....	....
Annin	....	....	....	....	....	....	....	....	....	....	....	....	....	15	....
Benton	....	....	....	....	....	....	....	....	....	....	....	....	....	62	....
Butler	....	....	....	....	....	....	....	....	....	....	....	....	....	54C	....
Ceres	....	....	....	....	....	....	....	....	1	....	....	4	....	60	....
Clarion	....	....	....	....	....	....	....	....	....	....	....	....	....	0.5	....
Danville	....	....	....	....	....	....	....	....	4	....	....	2	....	15	....
Endeavor	....	....	....	....	....	0.5	14	12	....	....	....	....	....	....	....
Findley	....	....	....	....	....	1	14&16	....	....	....	....	....	....	....	....
Gowen	....	....	....	....	....	10	16½	6	6	16½	6to12	....	....	....	....
Luzerne	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....
McHenry	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Mountaintop	....	....	....	....	....	....	....	....	....	....	....	....	....	0.1	....
Muncy	....	....	....	....	....	5	....	....	....	....	....	....	....	....	....
New Garden	....	....	....	....	....	....	....	....	1.75[f]	14	8	....	....	....	....
New London	....	....	1.7	....	....	....	....	....	....	....	....	....	....	....	....
North Shenango	....	....	....	....	....	....	....	....	....	....	....	....	....	20	....
Patton	....	....	....	....	....	....	....	....	....	....	....	....	....	12	16
Philipsburg	....	....	....	....	....	1	12	....	....	....	....	10	16	2	....
Plum Creek	....	....	....	....	....	2D	....	....	....	....	....	50	....	150	....
Plumstead	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Plymouth	....	....	....	....	....	22	....	....	....	....	....	....	....	....	....
Salisbury	....	....	....	....	....	....	....	....	3D[g]	12	4	....	....	....	....
Sparta	....	....	....	....	....	11	....	4	....	....	....	9	....	23	....
Upper Unchlan	....	....	....	....	....	....	....	....	0.5[f]	....	....	....	....	....	....
Wallace	....	....	....	....	....	....	....	....	0.5[f]	12	....	....	....	....	....
Wells	....	....	....	....	....	1	14	....	....	....	....	....	....	....	....
Willistown	....	....	....	....	....	3D	24	14	....	....	....	....	....	78	14
Young	....	....	....	....	....	1	14	....	....	....	....	....	....	....	....
South Carolina:						3.5	16	....	....	....	....	....	....	33	....
Abbeville	....	....	....	....	....	....	....	....	....	....	....	....	....	85C	....
Cherokee	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Marlboro	....	....	....	....	....	....	....	....	....	....	....	5D	16	....	....
Texas:									50D	....	4	100D	....	350D	....
Armstrong	....	....	....	....	....	....	....	....	....	....	....	32	....	31	....
Brown	....	....	....	....	....	....	....	....	200	14	....	25	14	700	....
Chambers	....	....	....	....	....	....	....	....	2C[e]	16	....	....	....	25C	16
Dallas	....	....	....	....	....	....	....	....	10C	16&18	8	....	....	10C	....
Dimmit	....	....	....	....	....	....	....	....	....	....	....	50C	....	250C	....
Deaf Smith	....	....	....	....	....	....	....	....	....	....	....	....	....	200	....
El Paso	....	....	....	....	....	....	....	....	32C&D	14	10	....	....	....	....
Frio	....	....	....	....	....	....	....	....	8	....	....	25	....	75	....
Gillespie	....	....	....	....	....	....	....	....	10D	16	....	5D	16	20D	16
Gray	....	....	....	....	....	....	....	....	....	....	....	15	16	....	....
Haskell	....	....	....	....	....	....	....	....	....	....	....	10D	12	500D	16to32
Jim Wells	....	....	....	....	....	....	....	....	2	14	....	....	....	15	40
Jones	....	....	....	....	....	....	....	....	....	....	....	8	12	800	16to32
Liberty	....	....	....	....	....	....	....	....	....	....	....	200C[h]	....	....	....
Lipscomb	....	....	....	....	....	....	....	....	....	....	....	....	....	75C	18
Lubbock	....	....	....	....	....	....	....	....	....	....	....	....	....	8C	....
Madison	....	....	....	....	....	....	....	....	....	....	....	5C	....	14C	....
Marion	....	....	....	....	....	....	....	....	....	....	....	22	26	20	24
Motley	....	....	....	....	....	....	....	....	2	12	8	15	12	15	12
Raine	....	....	....	....	....	....	....	....	....	....	....	22C	....	45C	....
San Jacinto	....	....	....	....	....	....	....	....	....	....	....	90C	30	....	....
Shelby	....	....	....	....	....	....	....	....	....	....	....	60	20	....	....
Stephens	....	....	....	....	....	....	....	....	....	....	....	....	....	75	....
Stonewall	....	....	....	....	....	....	....	....	....	....	....	10D	18	....	....
Taylor	....	....	4.7	16	1	....	....	....	6	16	8	....	....	....	....
Val Verde	....	....	....	....	....	3	....	8to10	....	....	....	....	....	....	....
Wavalla	....	....	....	....	....	....	....	....	....	....	....	....	....	130	24
Virginia:															
Halifax	....	....	....	....	....	....	....	....	....	....	....	....	....	21D	20
Washington:															
Douglas	....	....	....	....	....	4C	16	....	....	....	....	....	....	20D	....
						1D	16	....	....	....	....	....	....	....	....
Kittitas	....	....	....	....	....	7D	12	....	....	....	....	....	....	....	....
						12C	12	....	....	....	....	....	....	....	....
Pierce	3.86C	16	....	....	....	4	16	6	300	16	8	....	....	200	14
Snohomish	....	....	....	....	....	....	....	....	12C	....	....	....	....	....	....
Wisconsin:															
Trempealeau	....	....	....	....	....	7C	9	8	4D	9	7	....	....	15D&C	24
									9D[i]	9	....	....	....	....	....

[a]—Sand-clay, marl, rock or shell; all under way, but will not be completed this year. About 36¼ miles of shell 8 in. thick and 9 ft. wide. [b]—Pyrites. [c]—Bituminous and water-bound macadam. [d]—Including earth roads. [e]—Shell road. [f]—Slag road. [g]—Cinder road. [h]—Includes earth also. [i]—Shale road.

BREAKING UP CONCRETE.

There was described in last week's issue a method of breaking up concrete foundations, employed by a contractor in Lansing, which would seem to be applicable to use in removing old pavement foundations and other slabs of concrete. This method is to drop a heavy iron ball from a height of 20 or 30 ft., the blow being found to shatter the concrete as effectually as by the use of explosives, and probably at less cost and with less danger and interference with other branches of the work. The

ball can be lifted by means of a derrick, or by simply using a pole to the top of which is fastened a pulley, the pole being held in a nearly vertical position by guy-ropes and the ball being raised by hand by a rope run through the pulley.

TABLE NO. 2—COST OF HIGHWAY CONSTRUCTION IN 1917.

State and County or Town.	Total cost per mile or sq. yd.	Cost of grading per mile or sq. yd.	Cost of base, per mile or sq. yd.	Cost of shoulders per lin. ft.
BRICK.				
California:				
Santa Clara	$2,155 B&S	$0.227	$0.692	$0.032
Florida:				
Osceola	1.85 B	550	....	....
Mississippi:				
Pontotoc	22,000 BS	1,250	....	....
Ohio:				
Guernsey	26,000 BS	4,500	0.40	0.10
Madison	1.25	3,000	.75	.02
Ottawa	38,000 BS	2,500	.80	.05
Pennsylvania:				
Luzerne	3,000 BS	included	....	....
Texas:				
Hunt	10,000 BS	2,000	....	....
Washington:				
Pierce	1.79	3,930	0.60	....
CONCRETE.				
California:				
Contra Costa	$13,000 to 25,000 B&S	....	11,000 to 15,000	....
Santa Clara	0.95 B&S	$0.227	0.692	$0.032
Ventura	10,050 B&S	....	....	....
Connecticut:				
Clinton	2.00 S	....	....	....
Maryland:				
Baltimore	135 S& 160 S[a]	....	....	....
Talbot	16,000 BS	....	....	....
New Jersey:				
Burlington	2.29 S	....	1.30	....
Ohio:				
Defiance	13,400 BS	included	....	....
Ottawa	15,000 BS	1,200	1.90	.05
Pennsylvania:				
New Wilmington	27,666 BS	....	....	....
Texas:				
Dallas	1.40[b]	....	....	.09
El Paso	13,246 BS	....	....	....
Washington:				
Pierce	1.00	2,248..80	....	....
Snohomish	1.25 BS	....	....	....
BITUMINOUS CONCRETE.				
California:				
Santa Clara	$0.45	....	....	....
Connecticut:				
Plymouth	2.30	....	....	....
Florida:				
St. Lucie	3,000 BS	....	2,200	....
New Jersey:				
Burlington	1.32 S	....	....	....
Pennsylvania:				
Salisbury	15,000 S	old grade	old base	....
Washington:				
Pierce	.61	.21[d]	.81	....
BITULITHIC.				
California:				
San Joaquin	$.0925 .075 &S	....	old base	$250
Oklahoma:				
Jackson	2.04 B	....	....	....
Texas:				
El Paso	11,411 BS	....	....	....
Washington:				
Pierce	.75	2,000	.60[d]	....
WARRENITE.				
California:				
Ventura	.36	1,120	.60	included in grading
Washington:				
Pierce	.70	2,000	.60	....
BITUMINOUS MACADAM.				
California:				
Monterey	.34	250	old road	225 per mile
Connecticut:				
Wethersfield	.65	....	.70	....
Florida:				
Palm Beach	4,000 BS	included	....	....
Maryland:				
Baltimore	1.30 S	....	....	....
Mississippi:				
Oktibbeha	,80 BS	included	....	....
Ohio:				
Defiance	16,000 BS	included	....	....
Guernsey	15,000 BS	3,000	.45	.06
Pennsylvania:				
New London	14,000	....	....	....
Texas:				
Taylor	600	already graded	4,500	500

B, Cost includes base. S, Cost includes shoulders.

TABLE NO. 2—COST OF HIGHWAY WORK (Continued.)

State and County or Town.	Total cost per mile or sq. yd.	Cost of grading per mile or sq. yd.	Cost of base, per mile or sq. yd.	Cost of shoulders per lin. ft.
WATER-BOUND MACADAM.				
California:				
Butte	1,500 BS	200	....	....
Connecticut:				
Clinton	1.20 BS	....	....	....
Southington	.50	....	....	....
Stamford	6,000 BS	1,000	....	....
W. Hartford	1.05 S	included	....	....
Florida:				
Broward	.375 S	0 to $100	....	....
Levy	2,100	4,000	....	included in grading
Indiana:				
Posey	5,000 BS	included	....	....
Kentucky:				
Carter	10,000 BS	3,800	....	....
Greenup	.78 BS	....	....	....
Maryland:				
Baltimore	3,000 S	....	....	....
Mississippi:				
Oktibbeha	4,100 BS	800	....	....
New York:				
Yates	10,000 BS	15,000	4,000	....
Ohio:				
Defiance	10,000 BS	included	....	....
Gallia	8,073 BS	1,050	2,985	200 per mile
Madison	1,835 S	included	....	....
Ottawa	5,000 - 8,000*	3,000	....	.06
Pennsylvania:				
Endeavor	11,000 BS	included	....	....
Gowen	1,000 BS	....	....	....
Patton	160 BS	40	....	....
Salisbury	228	....	....	....
Wallace	4,500 S	....	....	....
Wells	8,000 S	....	....	....
Willistown	5,000 BS	300	....	....
Young	9,000 BS	6,000	....	....
Texas:				
Val Verde	2,000 BS	....	....	....
Washington:				
Douglas	4,500 S	included	....	....
Kittitas	2,500 to 3,800 BS	....	....	....
Pierce	.50	2,800	....	....
Wisconsin:				
Trempealeau	.3,200	550	....	none
GRAVEL.				
California:				
Butte	1,000	....	....	....
San Joaquin	.585	250	....	included in grading
Indiana:				
Clinton	2,944 S	....	....	....
Posey	3,800 BS	included	....	....
Indiana:				
Caddo	8,000 S	included	....	....
Tangipahoa	5,500 BS	included	....	....
Maryland:				
Charles	4,000 BS	included	....	....
Mississippi:				
Forrest	.55 S	1,200	....	....
Chickasaw	5,000 BS	included	....	....
Holmes	5,000 BS	2,000	....	....
Jones	8,000 BS	....	....	....
Madison	4,000 BS	included	....	....
Newton	5,000	....	....	....
Pontotoc	4,000	1,000	none	none
Simpson	500	500	....	....
Ohio:				
Defiance	4,000 BS	included	....	....
Pennsylvania:				
Amity	150 B	....	....	....
Gowen	600 BS	....	....	....
Texas:				
Brown	2,000 BS	40	....	....
Dallas	3,500 S	use old grade	....	....
Jim Wells	225 BS	included	....	....
Motley	500	250	250	100
Taylor	1,000 BS	Use old grade	....	....
Washington:				
Pierce	1,850	....	....	....
Wisconsin:				
Trempealeau	1,300	350	....	95
SAND-CLAY.				
Florida:				
Levy	2,070	500	....	....
St. Lucie	2,000 B	....	....	....
Georgia:				
Bacon	500 BS	included	....	....
Liberty	200 BS	....	....	....
Lowndes	600 B	600	....	....
Worth	300 BS	....	....	....
Mississippi				
Chattahoochie	1,250 BS	....	....	....
Forrest	.40	800	....	....
Holmes	1,000	750	....	....
Leake	1,500 BS	....	....	....
Madison	1,500 BS	included	....	....
Newton	1,100 BS	....	....	....
Winston	750 BS	....	....	....

(TABLE NO. 2—COST OF HIGHWAY WORK (Continued.)

State and County or Town.	Total cost per mile or sq. yd.	Cost of grading per mile or sq. yd.	Cost of base, per mile or sq. yd.	Cost of shoulders per lin. ft.
Oklahoma:				
Jackson	482 BS	....	....	....
Pennsylvania:				
Salisbury	185	....	....	....
S. Carolina:				
Abbeville	2,500 BS	1,400	....	....
Cherokee	900	....	....	....
Texas:				
Brown	400 PS	40	....	....
Gray	900 BS	....	....	....
Haskell	675	....	....	....
Jones	300 B	....	....	....
Madison	500	....	....	....
Marion	600	....	....	....
Motley	400 BS	....	....	....
Rains	250 S	....	....	....
San Jacinto	1,400 BS	256	....	....
Shelby	2,000 BS	1,500	....	....
Stonewall	1,000	1,000	....	....
EARTH.				
California:				
Ventura	....	13,300	....	....
Florida:				
Calhoun	400 S	....	....	....
Lee	....	12,000	....	....
Levy	395	....	....	....
Osceola	....	700	....	....
Iowa:				
Johnson	....	3,000	....	....
Webster	....	800	....	....
Kentucky:				
Greenup	1,800	....	....	....
Louisiana:				
Catahoula	90	....	....	....
Morehouse	....	40	....	....
Maryland:				
Talbot	125	40	....	....
Wicomico	50 to 500 S	40 to 400	....	....
Minnesota:				
Hubbard	2,000	....	....	....
Mississippi:				
Forrest	....	125	....	....
Choctaw	800 BS	....	....	....
Hancock	450	....	12	....
Jones	300 BS	....	....	....
Pontotoc	1,000	....	....	....
Tallahatchie	50 S	....	....	....
Missouri:				
Monroe	....	25	....	....
Ohio:				
Guernsey	9,000 S	7,500	....	....
Oklahoma				
Jackson	....	37.50	....	....
Pennsylvania:				
Amity	35	....	....	....
Benton	32	....	....	....
Clarion	150	....	....	....
McHenry	50	....	....	....
Salisbury	100	....	....	....
South Carolia:				
Abbeville	1,750	1,400	....	....
Texas:				
Brown	....	40	....	....
Chambers	1,000 BS	....	....	....
Deaf Smith	....	60 to 200	....	....
Dimmit	....	50 to 100	....	....
Gillespie	....	250	....	....
Jim Wells	....	75 S	....	....
Jones	....	60	....	....
Linscomb	900 BS	....	....	....
Madison	350	150	....	....
Marion	350	....	....	....
Motley	....	400 S	....	....
Rains	100 S	....	....	....
Stephens	60	....	....	....
Zavalla	....	200 S	....	....
Virginia:				
Halifax	1,550 S	850	....	....
Washington:				
Pierce	1,156	....	....	....
Wisconsin:				
Trempealeau	....	425	....	....
MISCELLANEOUS.				
Florida:				
Lee sand-clay, marl, rock and shell	.20	50 to 1500	50 to 1500	70 to 100
Levy (pyrites)	2,000 BS	650	....	....
Pennsylvania:				
New Garden (slag)	5,500 BS	700	....	....
Plymouth (cinders)	200	....	....	....
Upper Unchlan (slag)	1,200 B	....	....	....
Texas:				
Chambers (shell)	1,250	150	50	50
Wisconsin:				
Trempealeau (shale)	800	400	....	none

[a], $1.35 for 15-ft. width, $1.60 for 42-ft.; [b], laid on old base; [c], $.0925 for 16-ft. road, $.075 for 24-ft. road; [e], $5,000 for 10-ft. width, $8,000 for 16 ft.

TABLE NO. 3—SURFACE TREATMENT OF ROADS.

State and County or Town.	Kind of oil used.	Area treated this season, miles or sq. yds.	Cost of treatment.
California:			
Butte	95%	1	....
Contra Costa	95% asphalt	....	....
Kings	California crude road oil	....	....
Monterey	95% asphalt	None	....
San Joaquin	Asphalt	25	$500 to $800
Ventura	75% to 85% asphalt	....	....
Connecticut:			
Clinton	Road oil	6	....
East Lynne	Asphalt No. 4	10	2,500
East Windsor	Tar	....	....
Stamford	Standard No. 4 & Barrett 70%	50	7,500
Wallingford	"Dustoline"	Dirt roads	....
	Tarvia B	All bit. roads	.03
West Hartford	Standard No. 4 & Barrett B	220,000	.02 & .035
Florida:			
Broward	Mexican light oil, 72% asphalt	95,000	single, 5½ to 8c. triple, 13½c.
Palm Beach	U. S. Govt. 38 & 49	40	labor 5c, oil 5c
St. Lucie	Asphalt	None	....
Iowa:			
Johnson	Standard No. 4.	1	250
Kansas:			
Sedgwick	Standard 50% to 60% asphalt	1.5	390
Louisiana:			
Caddo	R. R. Office O-49 specifications.	....	....
Maryland:			
Baltimore	Tarvia, Ugite, Aztec, Standard Oil	75	7c to 9c per gal.
Queen Anne's	Tar	None	....
Talbot	Ugite B, Tarvia A & B	114,800	15c per sq. yd.
Wicomico	Tarvia & Ugite.	...	....
New Jersey:			
Burlington	Asphaltic	40	16c. per sq. yd.
New York:			
Yates	Bit. A	10	300
Ohio:			
Ottawa	H. T.	4	2,200
Pennsylvania:			
Coburn	Atlantic Refining road oil	0.2	....
Hickory	Tarvia	5	2,000
Jeffersonville	Light road oil	15	....
Plymouth	Atlantic. Ref. road oil, Tarvia B	6	....
Texas:			
Dallas	50% asphalt for gravel, 80% asph. for macadam	8	600
Liberty	Crude petroleum	6	200
Taylor	85% Texaco	4.7	....
Washington:			
Pierce	Fuel oil	6	95
Wisconsin:			
Trempealeau	Tarvia B & Standard No. 5	30	3¾c. per sq. yd.

MAKING AUTOS PAY FOR ROAD SYSTEM.

Building a system of highways entirely by money raised by license fees paid by owners of automobiles is a project on which the voters of Illinois will be asked to state their opinion at the November elections. The proposition is to issue bonds at the rate of ten million dollars a year, beginning in 1920 and continuing for six years, the bonds to be paid off by the automobile fees collected. To make this possible, it is proposed that the present fees for gasoline autos of $3 for 10 horsepower or less ranging up to $10 for 50 horsepower be increased next year to a minimum of $4.50 and a maximum of $20, and in 1920 to $6 and $25, and the motorcycle fees from $2 to $3 in 1918 and $4 in 1920. The fees for electric vehicles would be increased from $5 to $12 for those under 2 tons capacity, and from $10 to $25 for those of over 2 tons. The project of road building planned includes about four thousand miles of hard-surface roads.

The WEEK'S NEWS

State Highway Developments in Pennsylvania, Kansas and Wyoming—Typhoid in New York City and Joliet—New Water Rates in California Cities—Los Angeles Municipal Electric Plant Wins Litigation—Kansas City, Mo., Policemen Dismissed—Fire Prevention in Los Angeles—Coal Gas for Auto Fuel in England—State Control of County Finances in California—Open New York Subway Section—Car Strikes in San Francisco and Monroe, La.—Developing the Port of New York.

ROADS AND PAVEMENTS

State Road Aid in Pennsylvania.

Harrisburg, Pa.—During the next two years $1,873,470.40 will be distributed to the second-class townships of the state, this sum representing the state's share of the cash road tax bonus. During 1917, $929,325.20 will be distributed, of which sum $727,375.34 covers the bonus of 1910 and $201,959.86 for 1912. The 1911 bonus amounts to $944,135.20, which will be distributed to the townships during 1918, as the law does not permit the distribution of the entire appropriation during any one year. After all disbursements of the township cash road tax bonus fund as provided by the 1917 legislature, shall have been made, there still will remain unpaid the bonus for the years 1913 and 1914. Future legislatures must provide for the payment of this amount. Because the deficit was increasing so rapidly, the 1915 legislature suspended the bonus feature until such time as all back amounts were paid in full to the townships. The law requires that townships must file reports with the Bureau of Township Highways, of the State Highway Department, before they may receive this bonus. The state bonus money must be spent for one or more of the following purposes: Buying and installing concrete, cast iron, or corrugated pipe and installing concrete or stone masonry head walls; for the construction of concrete culverts and of concrete or of steel bridges, according to plans approved by the Bureau of Township Highways; for permanent grading, widening, or straightening roads; for the construction of brick, concrete, macadam, slag, gravel, or flint roads; for the construction of concrete, or concrete and stone retaining walls to support roads and the townships' share of the cost of state-aid road construction.

Cost of Good Roads in Kansas.

Topeka, Kans.—The Kansas Good Roads association has figured out some tables and other data relative to the improvement of roads in Kansas, and has set out to boost the 5,000 miles in five years improvement campaign. In order to improve a road, the law requires petitions from 35 per cent of land and 52 per cent owners, or 51 per cent of land and 35 per cent owners, or 60 per cent of land in district. Ponds are to run 10 or 20 years, and not over 5 per cent interest. The cost is divided, county 50 per cent; township, 25 per cent; and the property in the district, 25 per cent. Of course that is figured after the federal aid and road donations from any sources has been counted off. Railroads in district are subject to a special tax. Railroads and third class towns are subject to township tax. In average county, towns and railroads pay one-half of tax. According to the figures of the association, the various kinds of roads figure out on a basis of cost per acre as follows: Roads (gravel, sand, clay, or oil), to cost $1,000 per mile; average cost per acre, 10c; 1 cent per acre per year for 10 years. Roads (gravel, sand, clay or oil), that cost $2,000 per mile; average cost per acre, 20c; 2 cents per acre per year for 10 years. Roads (Taravia or asphalt macadam), that cost $6,000 per mile, average cost per acre, 55 cents; 6 cents per acre per year for 10 years. Roads (concrete), that cost $12,000 per mile; average cost per acre $1.13; 12 cents per acre per year for 10 years. Roads (concrete), that cost $14,000 per mile; average cost per acre, $1.36; 14 cents per acre per year for 10 years. Roads (brick or concrete), that cost $16,000 per mile; average cost per year per acre, $1.56; 16 cents per acre per year for 10 years, 8 cents per acre for 20 years. Roads (brick), that cost $18,000 per mile; average cost per acre, $1.76; 18 cents per acre per year for 10 years; 9 cents per acre per year for 20 years. Roads (brick), that cost $20,000 per mile; average cost per acre $1.95; 20 cents per acre per year for 10 years; 10 cents per acre per year for 20 years.

State Highway Plans in Wyoming.

Cheyenne, Wyo.—State highway engineer Z. E. Sevison has issued a statement regarding the work of the state highway commission which follows in part: "Until the last session of the legislature Wyoming was one of the six states that did not have a state highway department. This condition and the realization that real progress would never be made in the construction of good roads, together with the fact that aid could not be secured under the federal aid road act until a state highway department was organized, brought about the passage of the state highway act. The state highway act divided the state into five districts and created a state highway commission composed of a member, appointed by the governor, from each of the districts. The matter of districts has no other significance except to define the residence of the members of the commission. The state highway commission as appointed by Governor Kendrick consists of M. R. Johnston of Wheatland, Joe C. Kinney of Cokeville, Robert D. Carey of Careyhurst, F. E. Williams of Sheridan, and Gus Holmes of Cody. A system of state highways has been designated, including Lincoln highway, the Yellowstone highway, the Black and Yellow trail, and the more important of those roads on which federal aid may be secured. Other highways may be added to this system from time to time as their importance seems to warrant and the state develops. As the legislature in creating a state highway fund provided for only a one-quarter mill levy, which in 1917 will produce about $60,000, the money actually available for construction is very limited. This makes it necessary for the counties to provide the funds with which to meet the federal aid on a dollar for dollar basis. In view of the late date at which the department was organized, the spirit of cooperation on the part of the counties has been very gratifying, only one county having chosen to refuse to respond in any way up to July 1 the applications from the various counties for aid amounted to approximately $90,000, meaning that an equivalent amount had been appropriated by these counties. Before any construction work could be undertaken it was necessary that complete surveys be made in some counties there are no road records of any value. Surveys have now been completed for the Casper-Salt Creek road in Natrona county and for the Medicine Bow-Marshall road in Albany county and are in progress on nine other projects in various parts of the state, there being at the present time ten complete surveying parties in the field for the state highway department. It is expected to have the surveys either completed or under way, by August 1st, on at last thirteen different highway projects. Applications for federal aid on eight projects have been filed with the secretary of agriculture, and construction on these roads will necessarily have to wait until action has been taken by the federal officials. Careful investigation is developing the fact that a large percentage of our highways will need a surfacing of gravel or some better material if they carry the traffic that may be reasonably expected. The rapid increase in the use of the motor truck is doing more than anything else to limit the use of

the ordinary earth road, as well as the continued practice of hauling heavy loads on narrow tire wagons. Our next legislature should provide a statute limiting the wheel loads in proportion to the width of the tire. Owing to the fact that the federal aid road act provides that federal funds must be spent on post roads or roads that may hereafter be used as post roads, the Lincoln highway and the Yellowstone highway are eliminated from aid under this act except for very short sections. Both of these roads parallel railroads for the greater portion of their lengths and there is very little probability that they will ever become post roads. A larger state highway fund would permit the department to cooperate with all the counties through which these two highways pass in the construction of improved roads. Both of these roads are on feasible routes as through east and west, and north and south highways, and prove of great value to the people of Wyoming, as well as to a large and ever increasing tourist traffic. The total amount apportioned to Wyoming for the five year period covered by the federal aid road act is $916,900, and of this amount there was available on the first of July $183,951.

In order for this state to secure the full amount it will be necessary for each county to appropriate every dollar for construction that is not actually needed in maintenance. By maintenance is meant efficient work that secures a dollar's worth of work for a dollar expended, and not the wasteful squandering of funds under the road supervisors. Fortunately a number of the counties have come to see the almost criminal extravagance of maintaining road supervisors and have ignored them entirely, and it is to be sincerely desired that the counties will follow in this reform and virtually abolish a useless political job. This is all the more important at this time when the cost of labor and materials is rising so rapidly that every dollar spent should secure adequate return. One of the duties imposed upon the state highway engineer is that of preparing standard plans and specifications for all bridge work in any county, city or town where the span exceeds five feet or the cost exceeds two hundred dollars. This is a very wise provision, because it insures the construction of bridges which are properly designed for the loads which they must carry and prevents bridge companies and others from furnishing plans and bridges which are altogether too light and are designed mostly for selling purposes. Standard plans and specifications are now available for various types of structures, for any county, city or town in the state that may require them.

Highway improvement in Wyoming may be brought about most rapidly by larger appropriations on the part of the counties in order to secure federal aid and decreased expenditures for patch work. Over $500,000 was spent by the twenty-one counties of the state last year on roads and yet the mileage of improved roads secured for this expenditure was almost negligible. It is safe to say that each county can appropriate at least sixty per cent of its road fund toward new construction and when this is done rapid progress will be made."

Old Philadelphia Street Lengthened.

Philadelphia, Pa.—With the completion of work in progress Broad street, considered the finest of Philadelphia's thoroughfares, will stretch in a straight, paved line, 214 feet wide, from League Island on the south to city line on the north, a distance of eleven and three-quarter miles, claimed to make one of the longest paved streets of that width in the world. Incidentally, the perils to automobilists in "Dead Man's Curve" on York road will disappear. The grading is nearly finished, but the paving will not be completed until next year. Cutting the street through between Olney avenue and Elbow lane has been a tedious job. Several houses had to be torn down and several others moved aside to make it possible. When Broad street stretches its full length, the paving alone will represent an outlay of $1,500,000. The curbing will be the equivalent of $305,000. The lights and conduits are estimated to be worth $1,000,000. Broad street is almost as old as Philadelphia. According to the city historians, it was laid out by surveyor Holmes about 1690 along with Market street, with Centre Square, now Penn Square, as the intersection. They were to be the two wide streets of the town, and so they have remained until this day.

SEWERAGE AND SANITATION

Sewer Construction Not Emergency Work.

Milwaukee, Wis.—Judge Belden, of Racine, has upheld the eight hour ordinance for municipal contracts recently passed by the Milwaukee common council. The ordinance was contested on contract work for the Milwaukee sewerage commission, and in his decision judge Belden holds that an ordinance limiting the hours of work for municipal contracts can be passed by the common council, and that the sewerage commission, as a municipal department, is not immune to its provisions. It is also held that the work of excavating sewers under ordinary conditions is not such as can be considered an emergency exception. The case was a test one brought to try the constitutionality of the law and a contractor in the sewerage work was arrested on a charge of having violated the ordinance by working his laborers for a longer period than eight hours. The decision provides that this was a violation of the law. The decision upholds the right of the common council to make limitations for municipal contracts. Action was brought against the Wisconsin Tunnel Construction company. The case may be appealed to the supreme court.

Typhoid Cases Traced to Milk.

New York, N. Y.—A number of new cases and new suspected cases of typhoid fever were reported to Dr. Edgar Wisely, head of the Richmond health board, by special physicians appointed to follow the West New Brigton route of a milk dealer who had been buying contaminated milk from a farmer in Delaware, N. J. Thirty-five cases of typhoid are now being treated in the hospitals, while about forty suspected cases are under observation in Staten Island, where the outbreak is located. "The situation is not alarming, but it is serious enough to cause some anxiety," said Dr. Haven Emerson, health commissioner. "Under normal conditions Richmond would have about forty cases a year, and as long as that normal stage is maintained we pay no more than ordinary attention to it, but when this number of cases is reported in a few days we take quick steps to warn the public that the sanitary regulations must be observed strictly and the utmost care in the selection of food and milk must be taken." The New Jersey State Board of Health offered its aid in finding the source of contamination of the milk supply, and experts have carried the search to Delaware, N. J. It was found that one New Jersey dealer had served about 800 families, although his milk reached more than 2,000 persons because of the size of the families and because he sold to two ice cream dealers and one bakery. In one family seven cases are under observation. Most of the cases have been reported from one of the best residential districts of West New Brighton. The Richmond Board of Health is insisting upon giving all persons the anti-typhoid vaccine and upon sending special nurses and physicians to study all suspected cases. Special sanitary officers and physicians, as well as nurses, are at work in the district where the cases were found, and the Richmond Medical Association is co-operating. Officials of the State Board of Health have also offered their assistance.

Typhoid Found Not Due to City Water.

Joliet, Ill.—City water was given a clean bill of health following a visit of Dr. C. E. Crawford to the city to investigate eleven cases of typhoid fever recently under quarantine. Blame for the present epidemic has been placed unreservedly upon private wells which have become contaminated by surface water. Dr. Crawford, examiner for the State Board of Health, was summoned here by health commissioner Higgins because of the belief which had been expressed on the part of some Joliet physicians that mild cases of the disease which had appeared were malaria rather than typhoid fever. All of those ill were visited

and without exception Dr. Crawford confirmed the diagnoses which had been made, pronouncing the cases typhoid fever. The eleven cases are blamed on drinking water which had been contaminated by surface drainage. Five cases have been traced to the use of water from a so-called spring which was really seepage from rocks, children of the neighborhood being deceived by the fact that the water had been cooled by its passage through the rocks and drinking it while at play. The health department was able to prevent the use of this water after the appearance of the first typhoid cases only after stationing an officer on the premises and warning those who came to it. Two cases were traced to swimming in the DuPage river. All of the other cases were traced to the use of water from private wells. In only one family in which there is a case of the disease is there city water connection. However, it has been ascertained that the child who is ill had been in the habit of drinking water from a neighbor's well, and this is blamed for illness which has resulted. Health commissioner Higgins warned Joliet people to avoid water from private wells. As a result of the investigation of health commissioner Higgins and Dr. Crawford, the milk men of the city were absolved from all suspicion of having spread the disease in the city. In no two of the cases have the same milkmen been supplying the families. Dr. Crawford approved the city ordinance which authorizes the destruction of all milk bottles in homes in which the disease appears. The ordinance is declared to be stronger than the ruling of the state health department, which states that bottles from a home in which there is typhoid fever may be returned to a dealer after they have been thoroughly sterilized under the direction of the health department.

Nutrition Clinics Opened.

New York, N. Y.—Following the lead of Dr. William P. Emerson, of Boston, through whose efforts there was established at the Massachusetts General Hospital a special clinic devoted to the cases of defective nutrition, there have been established in this city five special nutrition clinics. These clinics were established mainly as the result of a co-operative investigation carried on by the Bureau of Child Hygiene of the Department of Health and the New York Association for Improving the Condition of the Poor. The clinics are intended mainly for the treatment and supervision of the large number of school children who show marked evidence of defective nutrition. A large part of the work of these clinics will naturally be educational, and instruction of the mothers in proper feeding of the family will play an important role. It is probable that classes of instruction modeled on the tuberculosis classes which have proved so successful in the anti-tuberculosis campaign will be organized as part of the work. One of the clinics will treat only children from one to six years old on one day of the week.

WATER SUPPLY

Commission Fixes Rates.

San Francisco, Cal.—The State Railroad Commission has established rates to be charged for domestic water in Placer county by the Pacific Gas and Electric Company. Different charges are established for Auburn, Rocklin and Colfax; for Newcastle and Loomis; for wholesale to the town of Lincoln, which has its own municipal system; to the Roseville Water Company, which sells water in Roseville, and to the Southern Pacific Company at various points along its line. The commission specifies the new rates are to be for "pure, clear, fresh water," and that they shall not go into effect until the commission certifies in a supplemental order that this quality of water is being supplied. Monthly flat rates of $1.25 for residences, apartments, etc., of five rooms and less are fixed; fifteen cents for each additional room, twenty-five cents additional for each bath tub, etc. Sprinkling is set at three cents per hundred square feet of lawn, garden, etc., when taken continuously, and seven cents otherwise. From $2 up is the rate fixed for shops. Monthly meter rates were fixed with a minimum of $1.00, at twenty cents per hundred cubic feet, for the first 1,000, ten cents per hundred for the next 4,000, four cents for the next 5,000, and two cents per hundred for all over 10,000. For the town of Lincoln and the Roseville Water Company rates are established at sixteen cents a miner's inch per twenty-four hours. The Pacific Company and its predecessors have been selling water for domestic and irrigation use in Placer county for many years, and supplies practically all the water in that county. The commission held a number of hearings upon the question of the rates of the company in the territory mentioned, and it was shown that the company had no consistent schedule.

Survey Report on Water Rates.

Springfield, Ill.—The survey of the Sage Foundation finds that the local water rates "make a very favorable showing" compared to rates in other cities. The report says that comparisons are complicated "since a number of different methods were being used in fixing rates, and comparisons between Springfield rates and rates charged elsewhere were therefore not particularly significant. Moreover the fairness of a rate must take in account the source of the water supply, size and ownership of the plant, the quality and treatment of the water, the manner of its distribution, and numerous other conditions—considerations which are not taken into account in a mere comparison of rates."

According to authorities quoted in the report, "data from 640 American cities showed the average of the highest rates per 1,000 U. S. gallons was 27 cents; and the average of the lowest 11 cents." The surveyors found that the "highest rate charged for commercial or domestic uses of water in Springfield was 14 cents per 1,000 gallons, while the lowest rate was six cents per 1,000 gallons. Recent figures show the local rates slightly above the earlier figures, but they still are much below the average of the 640 cities. The more recent figures for the highest Springfield rates are 16 2-3 cents per 1,000 gallons for both domestic and commercial uses, and where the rate is lowest 6 2-3 cents per 1,000 gallons for commercial uses and 11 cents for domestic uses. Thus at only one place is the Springfield figure as high as the average of 640 American cities; and in that case the equality of rates is at one of the least important points; for the eleven cent charge applies only in cases where 105,000 gallons of water are used for domestic purposes each quarter year—an amount reached by only a few consumers. Thus the comparison shows the Springfield rates well within the bounds of general practice." The report says that "it is cheaper to pay a private individual or company a substantial profit than to lose a greater amount through public inefficiency. Springfield's experience in public ownership of the water supply would invalidate this line of reasoning, since the local water system and its management compared favorably with similar enterprises privately owned." The survey examination of the local water works confirmed the conclusions of the Illinois State Water survey. The latter said regarding water rates: "The general indication of these figures is that the city of Springfield has secured a water supply at comparatively low cost for installation, and that the unit costs are moderate and are being gradually reduced year by year." The uniform system of accounting and cost data required by the State Utilities commission for privatey-owned water works was voluntarily installed by this publicly-owned plant in Springfield.

While the rates charged are reasonably low, a few difficulties relating to details still remain to be equitably adjusted. One relates to the methods of scheduling the rates. Although the instances are rare, they are significant in indicating certain inconsistencies in the rate schedule. One method of obviating this difficulty, which is gaing considerable acceptances, is to charge a fixed sum of money determined according to the size of the meter and according to a certain maximum quantity of water allowed to be used in the year. For example, where a five-eighths-inch meter is used the payment of, say, five dollars would secure a maximum of 25,000 gallons of water per year; $10 (a three-fourth-inch meter being used) would secure an annual maximum of 50,000 gallons—the average amount used annually in domestic service; and on up the scale. All water furnished in excess of the maximum allowed for each different meter size would be charged for at the rate of, say, fifteen cents per 1,000 gallons. The rates themselves would need to be computed, of course, after a careful study of the cost of supplying the water and the local method of distributing this cost among consumers.

Another method is to charge a certain fixed amount for each connection with the water system, the amount depending on the size of the meter; and then to charge a uniform rate for all water furnished. For example, the fixed charge of a five-eighth-inch meter connection might be twenty-five cents per month; for a three fourths-inch meter, 40 cents, for an inch-meter, 65 cents, etc. And in addition a straight charge of, say, ten cents per 1,000 gallons would be charged for all water used. It might be desirable, instead of making one rate for all water used in the latter case, to charge two or three rates graduated according to the amounts consumed. One rate is theoretically correct, but at times there appear to be special reasons for varying from it. Again, as in the other method, the exact rates could and should be computed from the very excellent cost data in the hands of the water department and from an operation statement similar to the one now made up by the department.

There is a certain "overhead" and operation cost; that is, the cost of furnishing service, reading meters, etc., which is in addition to the cost of securng and pumping water. This cost should be borne to a large degree, if not entirely, by the flat meter charge suggested in the second method. After that is taken care of there is no good reason why all persons should not pay at the same fixed rate for the water they actually use. This principle is the foundation of all regulation of rates, and any substantial deviation from it savors of rebating and is particularly obnoxious in municipally-owned utilities.

The general conclusions of the surveyors is that the water department as a whole was being very efficiently managed. Attention is called to progress made since the original investigation by the survey agents. "Several recommendations as to details in which the office work of the water department could be improved were made in the earlier drafts of this report. Most of these have received action. One related to the unit of measurement used as a basis for making water rates. Formerly the rates were based upon a certain charge per thousand gallons, although all the meters measured by the cubic foot. This not only made it difficult for most persons to check their water bill against the meter charge, but it entailed a great deal of extra work in the water department and caused some errors. There appeared to be no reason why rates should not be made on the cubic-foot basis and it was so recommended; the change in this basis has since been made."

Waterworks Profits Lower Tax Rates.

Orange, N. J.—Though the Orange city commission was notified of a prospective excess of expenditures over receipts this year in the water department, it voted to transfer $25,000 of an accumulated surplus in that department to the general city fund, with the result that the tax rate will be reduced twelve points, from an estimated $2.52 to $2.40. Last year's rate was $2.37. The department's annual earnings are about $30,000 and the plan may be adopted as a regular policy. The action will leave a balance of about $12,000 in the fund, aside from over $50,000 loaned the city at two per cent. As the tax budget stood, the amount to be raised by taxation was $410,935.26, and the reduction will bring it to $385,935.26. Director of public utilities Wethling states that the department could afford to have its surplus reduced this year and that as the people had paid for the water system they had a right to benefit by any funds it might return above expenses, instead of having the commission loan it to the city at two per cent. There is need for the tax reduction this year, he said. Commissioner William A. Calhoun, director of finance, objected on the ground that financial conditions in the country generally make it advisable to leave the surplus intact as a fund from which the city could borrow on notes, as it may have difficulty in borrowing in anticipation of taxes.

STREET LIGHTING AND POWER

Rate Increase Denied.

Flemington, N. J.—Permission to increase the cost of its gas from $1.40 per 1,000 cubic feet to $1.90 has been denied by the state board of public utility commissioners to the New Jersey Northern Gas company, consolidated of the Flemington and Lambertville Gas Light companies. In addition to its other territory this firm also serves the boroughs of Pennington and Hopewell. The board states that from the testimony submitted it seems evident that if the high cost of gas manufacture continued additional revenues would be needed, but that the testimony failed to indicate how much additional revenue would probably result from the new tariff. In the new schedule the company proposed a fixed or service charge of 50 cents for each customer each month in addition to $1.40 per 1,000 cubic feet of gas consumed. The board comments that there was no satisfactory proof that the service charge bears a proper relation to the cost of readiness to serve. The company, in its application, stated that the rates in the territory supplied by it had been reduced at the time the company was formed by consolidation and that a further reduction had been made on January 1, 1916, providing for a net rate of $1.50 per thousand cubic feet. The rate at present charged is $1.60 per 1,000 cubic feet, with 10 cents reduction for prompt payment and the proposed rate was $1.40 a thousand, with a fixed charge of fifty cents a month additional. Because of its inability to conclude that the tariff would be fair and reasonable to all classes of consumers sanction for any alteration was withheld. In its application the firm maintained that the cost of manufacture is 30 cents, net, higher per 1,000 cubic feet than it was in 1916. Last year, it held, the net cost was 84.9 cents per 1,000 cubic feet of gas sold, and during the first five months of this year it advanced to $1.149 without taking into account interest on bonds or dividends on stock. The borough clerk of Pennington and the Housewives' League of Flemington protested against any change in the price of the product.

City Wins Power Competition Case.

Los Angeles, Cal.—The validity of the temporary operating power contract between the city of Los Angeles and the Southern California Edison Company, under which the city is receiving $2,000 a day or more from the distribution of aqueduct power, has been sustained by superior judge Shenk. The city wins an important victory over the Los Angeles Gas and Electric corporation by this decision. It was this corporation which sought to have the courts declare the operating contract, under which the company distributes the city's power, and the city sells the surplus aqueduct power over its own needs to the corporations, invalidated. The suit was one of the long series precipitated by the Los Angeles Gas and Electric corporation to hamper the city in developing and distributing its aqueduct power, and the decision of judge Shenk, sustaining the legality of the contract, in almost the same manner that the state railroad commission sustained it, was hailed with gratification by the public service commission and its attorneys. W. B. Mathews and W. B. Himrod, who represented the city in the litigation, assert that unless the case is appealed by the gas corporation, the city can go ahead unhampered under judge Shenk's opinion. The gas corporation, city officials say, is seeking to prevent the city from using the revenues of the power to pay interest and sinking fund charges on the power bonds. It is said that the company will appeal the case.

War Conditions in English Municipal Plants.

Leeds, England.—The report of the Leeds corporation electricity committee for the year ended March 31, 1917, states that "the number of units sold for all purposes was 54,992,742, an increase of 22.7 per cent. For power purposes the sales of energy had increased rapidly, owing to war requirements, the number of units sold having advanced by 46.6 per cent. The police lighting regulations and daylight saving during the summer of 1916 caused the sales of energy to private lighting consumers to remain practically stationary, while the sales for street lighting had practically disappeared, being only £352 ($1,713), as compared with £1,188 ($5,781) in the previous year, and £2,530 ($17,179) in the last pre-war year. The sales of energy to the tramways department showed a further decrease of 29.6 per cent, representing the extended use of the separate tramways generating station. It is pointed out that the war prices of materials and labor caused the working expenses to increase in greater ratio than the income. The profit for the year was £17,286 ($84,122), an increase of £196 ($954), as against the year before. Out of this sum £13,125 ($63,873) had been contributed to the cost of permanent works, leaving the surplus profit at £4,161 ($20,250), which has been transferred to the reserve fund."

FIRE AND POLICE

All Firemen Now Regulars.

San Jose, Cal.—City manager Reed announces that the fire department is now composed entirely of "full-time" men, being at last free from the old conditions which kept a dozen men subject only to emergency call. The change was made complete with the dropping of the last two "call" men on the list and the appointment of two regular firemen to take their places. Under the old system, says Reed, the efficiency of the department was greatly hindered, as no special dependence could be placed on employees of this sort, since they could not be gotten in every case when an emergency arose. The "call" men were used particularly for night alarms. Reed says that there were fifteen of these men when he first took office, and that on last December ten were replaced by as many regulars through action taken by the city council.

Policemen Dismissed After Car Strike.

Kansas City, Mo.—The board of police commissioners has discharged forty-one patrolmen and two police sergeants, who during the recent strike of the employes of the Kansas City Railways declared that they would not give protection to the imported strikebreakers. Many of these were policemen from the station near the carhouse, where there was a great deal of rioting. When the cases of the policemen charged with insubordination came up, all the men reiterated their positions that they would not ride on cars to protect imported strikebreakers. Business men urged that the men be discharged in the interests of discipline. Several local labor unions united in an alleged threat to cause a strike of 12,000 workmen if the policemen were discharged. The business agent of the Industrial Council and the president of the Business Trades Council sent a telegram to the lieutenant governor asking that the discharge be prevented. The police board is appointed by the governor, and is independent of local control. There was no difficulty following the discharge of the policemen.

Fire Prevention Work Helps Reduce Losses.

Los Angeles, Cal.—Losses by fire on buildings in Los Angeles and on their contents were reduced radically through the working of the fire prevention bureau, according to the report on the work of the bureau by Archie J. Eley, fire chief. The reduction in the loss by fire on the contents of buildings was approximately $200,000, and the loss on buildings was cut more than $35,000 through the rigid inspection and the careful enforcement of fire prevention precautions by the bureau. The total number of inspections made was 39,120. The showing made by the fire prevention bureau in the eleven months in which it has been in operation up to the beginning of the new fiscal year was received with much satisfaction by the fire commission. Increase of the bureau and extension of its activities are planned during the present fiscal year. The fire loss on buildings during the eleven months' operation of the bureau up to July 1 was $239,324, and the loss on contents was $445,696. During the previous year the loss on buildings was $275,705, and the loss on contents was $630,003.

Boys Organize for Fire Prevention.

New York, N. Y.—Boys in the congested Brownsville section of Brooklyn have come forward with a new plan for co-operation with the city in preventing fires. Three boys have organized a junior fire brigade consisting of twenty-five members, each of whom signs a pledge "to prevent fires, to help educate the people to prevent fires, and to do my duty at all times." The boys will call the attention of their neighbors to common fire hazards, attempt with the utmost persistence to have these hazards eliminated, distribute fire prevention literature where it will be of real value, and possibly arrange for meetings on fire prevention in their schools. Fire commissioner Robert Adams has sent the boys the following letter: "I am in thorough sympathy with your plan for the organization of a junior fire brigade and I think the idea is an excellent one. Your pledge to prevent fires, to help educate the people to prevent fires, and to do your duty at all times, seems to me to cover the objects of your organization very well; and your badge will add distinction to your membership. The fire department will be glad to co-operate with you in the distribution of such fire protection material as we have, in arranging meetings on fire prevention provided you can secure sufficiently large attendance, and in hearing reports from you and your co-workers on fire prevention conditions in your district. I trust that you will be the pioneers in organizing the younger element in the city for the work of preventing fires."

MOTOR VEHICLES

New Auto Apparatus Installed.

Owosso, Mich.—The city commission recently installed two pieces of motor fire apparatus in the central station. It purchased a Duplex combination hose and chemical truck and has leased a hook and ladder truck, also from the same manufacturers. The city will pay $55 per month for the hook and ladder until spring, when if it wishes, it can purchase the outfit at $4,000, the money paid in rent, to apply on the purchase price.

Auto Fire Apparatus Service.

Emporia, Kans.—The Emporia fire department's new motor truck has been recently installed after a try-out by Charles Stinson, chief of the local fire department. The new truck was built over a White chassis by the Anderson company in Kansas City. The truck is propelled by a 6-cylinder engine, rated at 60-horse power, but capable of developing 78-horse power. The machine's motor is equipped with an electric starter as well as with an auxiliary crank. The rear wheels are 36x5 and have solid rubber tires. The truck itself weighs about 5,000 pounds. The truck contains many features suggested by chief Stinson and the Emporia city commissioners. It has a carrying capacity of 1,200 feet of hose. It carries four chemical extinguishers, two 24-foot ladders and a full assortment of auxiliary tools. It is capable of a speed of fifty miles an hour. Six men can be carried. The truck cost the city about $4,500.

Coal Gas Fuel for Motor Vehicles in English Cities.

London, England.—With the price of gasoline at 61 cents per gallon, retail, numerous substitutes for furnishing vehicular motive power have appeared on the market. A development in the use of coal gas for automobiles has passed the experimental stage, a motor bus using coal gas having made the journey from London to Eastbourne and return, a total distance of 130 miles. The Grimsby municipality, which operates a system of motor driven omnibuses to outlying districts, is said, after a trial extending over four months, to have effected a reduction in fuel cost per mile from 4.30d. to 1.66d., the price of gasoline being 61 cents per gallon, and gas 61 cents per 1,000 feet. The only change made in the motor is the fitting of a butterfly valve in the air-intake pipe for the regulation of the air supply, which allows the engine to draw the gas in the correct quantity according to load and speed. It is claimed that an advantage accruing from the use of gas is that the engine is cleaner and the valves do not require grinding so often. In Yorkshire the use of coal gas for automobiles appears to be increasing rapidly. Recently Harrogate adopted it, and now Halifax and Todmorden have decided to give it a trial. The necessary apparatus is relatively cheap and easily adjusted, consisting of a canvas bag with an inner layer of rubber, shaped like a mattress, which holds the gas drawn from the main, and is strapped to the top of the motor omnibus or to the rear of the automobile. The gas in the bag is connected with the induction pipe, and the engine is worked by the suction press in the same manner as the ordinary gasoline vapor induction. The principal disadvantage to the use of coal gas for automobiles is the bulky container necessary for the gas. The use of gas for small cars has proved unsatisfactory by reason of the problem of adequate space for storage. A suitable cylinder

for containing compressed gas is said to be necessary for the general usage of such fuel for motor cars, and the probability of the continued utilization of coal gas as a substitute for gasoline appears to depend upon facilities for storage or compression.

GOVERNMENT AND FINANCE

Mayor for Twenty-Five Years.

Danville, Va.—Captain Harry Wooding is perhaps the first Virginia mayor to have the distinction of serving his townspeople for a quarter of a century without interruption. When mayor Wooding first assumed the reins of government in 1892, Danville was a small border town, with saloons on nearly every corner. There were mule street cars, which gave service in part of the city only, and North Danville, now part of the city of Danville, was a separate community, known as Neapolis. Mayor Wooding has watched the town develop along every line, and he has seen it almost double in size.

New Charter Adopted.

Xenia, O.—This city has adopted the charter proposed under the new commission form of government by nearly a 4-to-1 majority. The result of the election was 795 to 211 against.

Mayor Cleared of Bribery Charge.

Ottumwa, Ia.—Pat Leeny retains his office as mayor of this city. The proceedings to oust him have failed, judge M. E. Hutchinson, of Lake City, deciding that charges made against the mayor had not been sustained. The charge against Leeny was that he had offered $1,500 to influence the other commissioners to vote for a paving contract, saying he would get $3,000 if the company got the business. The testimony was not corroborated, according to the judge. As no other charges, involving the conduct of the mayor in connection with enforcement of the law, the court did not find a preponderance of evidence against the mayor, but said he would not give him a certificate of character.

Fire Insurance on Municipal Property.

Columbus, O.—In the period from January 1, 1907, to August 20, 1917, the city of Columbus expended $35,670.84 in fire insurance premiums on its many properities. In the same time, only $218.20 has been realized in recoveries. Those figures are indicated in a report to council by city auditor Ginder. "A study of the ezpenditures made by the city," the report says, "in the last ten years for the purpose of fire protection, and a comparison of this expenditure with the amount recovered because of fire losses, might easily convince one that the city, as a corporation, is over-insured. Past experience is the most equitable basis upon which to figure future payments for that purpose."

Referendum on County Tax Limitation Law.

Sacramento, Cal.—The county tax elimination bill, passed by the last legislature, is subject to referendum vote at the next general election, or at a special election called before that time, the state supreme court at San Francisco has decided. The decision reverses the opinion of attorney general U. S. Webb, who submitted it as a test case to determine the question before the tax levying date. The bill was signed by governor William D. Stephens and was designed to limit and regulate amounts that each county should produce by tax levies and created a State Board of Authorization. A referendum was immediately launched against it under direction of the superintendent of public schools of Los Angeles, and others. More than 50,000 names were secured. The question arose as to whether the bill became immediately effective or not for ninety days, and therefore subject to referendum vote. Opposition to the bill was voiced principally in Los Angeles County, according to the attorney general's office, because of uncertainty as to its application to school districts. The suit before the supreme court was taken to force secretary of state Frank Jordan to place the measure on the ballot in November, 1918, by referendum. Jordan had been advised that the act could not be submitted to a referendum because it was a tax measure. The decision follows a referendum brought against the bill by representatives of school organizations in the state, who feared that the law would be operated to cut down school appropriations. When the referendum petition was filed, secretary of state Jordan refused to receive it, being guided by the advice of attorney general Webb, who said it was not a subject for referendum, being a tax measure. The decision holds up the law until it can be voted upon by the people, and all the year's work performed by the Board of Authorization is nullified. The act created a board of authorization of five—the state controller, chairman of the board of equalization, a member of the board of control and two others to be appointed by the governor. They serve without pay. The singular feature of the case is that in every case the school boards in the various counties received every cent they asked for and in every case more than the year before. Every county had been heard from except Sacramento, which will not now have to file its budget.

TRAFFIC AND TRANSPORTATION

New Subway Section in Operation.

New York, N. Y.—The first section of the new Broadway subway of the Brooklyn Rapid Transit System has been put into operation. The section is about 1½ miles long. Through service is now given between Union Square and Coney Island. Trains leave Union Square every three minutes during the rush hours, and at other times every three and three-quarter minutes, except between 1 and 5 a. m., when the headway is fifteen minutes. The new line is calculated to relieve the old system of at least 15,000 persons daily in rush hours. It will enable many additional Manhattan workers who reside in Brooklyn to reach their homes for a 5-cent fare. The opening of the new section was attended by a number of public officials, and the guests were entertained by the Borough Park Heights Civic Association. Progress on the Broadway subway is such that it is expected to extend operation as far as Times Square before the end of the current year, and during 1918 it is expected that it will be completed to its terminal in the borough of Queens.

Strike by Municipal Railway Employes.

Monroe, La.—The lines of the city-owned street railway have been tied by a strike of the employes. The union, in calling the strike, is protesting against the recent action of the city council in voting to instal one-man cars. The strikers declare that this is against their contract with the city which, they say, calls for a motorman and a conductor to operate each car.

The San Francisco Car Strike.

San Francisco, Cal.—Violence has marked the continued bitterness in the strike of the employes of the United Railroads and service is intermittent and rather a challenge to the strikers than a convenience to the public. The company has made a number of attempts to run cars, an armored car being run in one trip. One employe was killed and a number injured. A grand jury committee, organized to bring about a settlement, has been unsuccessful, president Lilienthal of the company insisting that there is nothing to arbitrate. He asks adequate protection from the city and declares he can give full service with imported strikebreakers. Meanwhile the municipal car lines are reaping a harvest, the earnings for August being $228,646, the largest month in the line's history, except August, 1915, during the year of the exposition. The Labor Day earnings were $11,574, the highest for any one day. The city is running seven municipal buses which are proving very popular. The city has also, by arrangement with the Ocean Shore Railroad and the Southern Pacific lines, instituted a special municipal service to several big factories for the convenience of the workers. The Ocean Shore line provides the trains, engine crews and operation, while the city pays a fixed price for the trains, collects the fares, handles the transfers (free to all municipal lines) and assumes

responsibility for accidents. The city supervisors have adopted a resolution to investigate the finances of the company, and have been considering the possibility of forfeiting its franchises and taking over the operation of the lines. In a recent statement president Lilienthal said: "It is true that the men can force the company into bankrutpcy, but that will do them no good. I think the public should realize that no dividends have been paid on stock of the United Railroads for years; that there are pending foreclosure proceedings on defaulted bonds, and another threatened on the unpaid 4 per cent bonds, upon which no interest has been paid. A majority of the bonds on which default has been made are held in California. With the growing competition of the Municipal Railroad and the competition of the jitney bus, our income has diminished. When I voluntarily gave our men a raise on July 1, realizing the increased of living, I figured out the last dollar I could spare." The men demand particularly recognition of the union and rates of wages similar to those paid by the city lines. The city board of health has warned the company that it is violating the new state housing law by quartering more than twenty men, the strikebreaking carmen, in one dormitory.

Company Forced to Buy New Cars.

New York, N. Y.—Defeated both in the state and federal courts in their efforts to resist the public service commission's order requiring the purchase of 250 additional cars, believed by the commission to be needed for the furnishing of adequate service on street surface lines in Brooklyn, the Brooklyn Rapid Transit Company and its subsidiary companies have notified the commission of their intention to proceed now with the necessary steps to comply with the order. The companies say: "The proceedings which we have taken and are taking in conformity to the order of the commission are taken under duress and fear of prosecution and are not to be regarded as admitting the validity of the commission's order or as evidence of waiver of these four companies' rights under the law and constitution." Referring to the companies' tardy acquiescence in the commission's order and the reference to "duress" and "compulsion" in the company's letter, William L. Ransom, chief counsel of the commission, who conducted the fight in the courts to compel the companies to comply with the commission's order, said: "Of course that is just what the Public Service Commission Law contemplates; namely, that if, as the state and federal courts have found and held, the commission after a fair, full hearing makes a reasonable order fully warranted by the evidence and demanded by the disclosed conditions, the companies shall obey it whether they like it and agree with it or not. If the commission makes a proper order and no court finds any reason for interfering with it, the statute of course contemplates that the companies shall be compelled to obey it, by statutory penalties or by criminal proceedings, if need be."

MISCELLANEOUS

New Municipal Ice Plant.

Wadsworth, O.—The town of Wadsworth will have the first municipal ice plant in Ohio. City clerk H. E. Hiess succeeded in persuading the state industrial commission in Columbus to purchase $10,000 worth of bonds issued for the erection of the plant. This plan was suggested by city solicitor F. O. Smoyer when other sources failed. The bonds will be awarded at once and the work of installing the plant will progress in time to have it completed by the beginning of summer, 1918.

General Goethals for Port Development.

New York, N. Y.—The New York and New Jersey port commissions have organized by appointing general George W. Goethals chief consulting engineer. The commissions elected J. Spencer Smith and William R. Willcox chairmen. The work, Mr. Willcox explained, will pertain to matters which affect the development of the port, the Jersey Meadows and all territory contiguous. The commissions, after they have concluded their investigations, will make reports to the New Jersey and New York legislatures.

LEGAL NOTES

A Summary and Notes of Recent Decisions—Rulings of Interest to Municipalities

Bond for Jitney Operator—Liability of Surety.

Washington—Under Rem. Code 1915, § 5562—37 et seq., requiring jitney operator to give bond, elements of damages for which recovery may be had against principal enter into and form part of liability against surety to limit of amount of bond.—Singer v. Martin, 164 P. 1105.

Transfer of Powers—Continuation of Regulations.

New York—By Laws 1914, c. 495, providing powers given municipal explosives commission of city of New York are transferred to fire commissioner, etc., continuing in force regulations of commission, regulations were continued, not only during interregnum consequent on abolition of commission and transfer of its powers to fire commissioner, but for future.—Stubbe v. Adamson, 116 N. E. 372, 220 N. Y. 459.

Salary—Fixing—Recovery.

North Carolina—Resolution of city aldermen, allowing a sinking fund commissioner a specified annual salary for previous years, and charging against him certain items, leaving a balance due city, sufficiently fixes salary to authorize its recovery, although debits against him were invalid.—Borden v. City of Goldsboro, 92 S. E. 694.

Regulating Jitneys—Free Rides for Policemen and Firemen.

Pennsylvania—City's regulation of jitneys may include requirement of a reasonable bond to secure payment of damages recovered for loss of life or injury to person, etc., from their negligent operation. An ordinance requiring operators of jitneys to cary policemen and firemen in discharge of their duties free in any vacant seats was unreasonable and unenforceable.—Jitney Bus Association of Wilkes-Barre v. City of Wilkes-Barre, 100 A. 954.

Municipal Building—Limit of Cost.

Pennsylvania—Where municipal ordinances and notices of election on an increase of indebtedness state, as one item, certain sums for erection of a public building, which form is followed in the ballot, municipality may not erect such building at a cost greater than that so stated.—Raff v. City of Philadelphia, 100 A. 815.

Sinking Fund Bonds—Limitations on Tax Levies.

Ohio—In providing sinking fund to discharge bonds issued after June 1, 1915, in compliance with orders of state board of health issued and approved before that date, municipal taxing authorities should disregard the limitations on tax levies provided by Page & A. Gen. Code, §§ 5649—2 and 5649—3(a).—State v. Dean, 116 N. E. 37.

Contractor's Employee—Injury—Liability of City.

Kentucky—Employee of contractor to repair machinery in city's waterworks when on the premises is not a mere licensee, but an invitee, to whom it owes a duty as to safe condition of steps which he must use.—Flutmus v. City of Newport, 194 S. W. 1039.

Obstructing Sidewalk—Necessity.

West Virginia—In case of necessity, as the erection or repair of buildings upon adjacent private property, municipality may permit the temporary obstruction of sidewalk.—Johnson v. City of Huntington, 92 S. E. 344.

Right to Percolating Waters—Diversion.

Michigan—The right of a landowner to use percolating waters is none the less qualified by the rule of reasonable user, because it is a city and is seeping water for its inhabitants. Where a city may divert percolation waters from its land for its inhabitants without violating the rule of reasonable user, and in so doing is not harming plaintiff, it will not be enjoined; but plaintiff will be allowed damages for prior injury, with right to apply to the court in case of future injury.—Schenk v. City of Ann Arbor, 163 N. W. 109.

THE MUNICIPAL INDEX

In Which Are Listed and Classified by Subjects All Articles Treating of Municipal Topics Which Have Appeared During the Past Month in the Leading Periodicals.

It is our purpose to give in the second issue of each month a list of all articles of any length or importance which have appeared in all the American periodicals and the leading English, French and German ones, dealing more or less directly with municipal matters. The Index is kept up to date, and the month of literature covered each time will be brought up to within two or three days of publication. Our chief object in this is to keep our readers in touch with all the current literature on municipal matters. In furtherance of this we will furnish any of the articles listed in the index for the price named after each article, except that where an article is continued in two or three issues of the paper, the price given is for each of said issues. In addition to the titles where these are not sufficiently descriptive or where the article is of sufficient importance, a brief statement of its contents is added. The length also is given, and the name of the author when it is a contributed article.

ROADS AND PAVEMENTS.

Bituminous:

Cold Bituminous Mixture for Wood Floor Highway Bridges. Surfacing used by Illinois Highway Department. By E. H. Piepmeyer. 2 ills. 1,000 words. Engineering & Contracting, August 1. 10 cts.

Methods of Applying Bituminous Materials. Discusses cold surface, hot surface, and penetration surface binders. From a paper by G. Cameron Parker. 3,000 words. Good Roads, August 11. 10 cts.

Experimental Roads in Iowa. Results of experiments with bituminous carpet coats on gravel and concrete. Method of applying and type of oil recommended. 1,000 words. Municipal Journal, August 23. 10 cts.

Concrete:

Tests of Concrete Road Aggregates. Object and description of tests. Comparison of field and laboratory concrete. Conclusion. 2 ills. 4,000 words. From a paper by J. P. Nash. Good Roads, September 1. 10 cts.

Machinery Replaces Men on Concrete Road Building. On a Connecticut road, a road grader is used instead of hand grading and motor trucks transport all materials. Unloading sand and stone. 2 ills. 1,100 words. Municipal Journal, August 2. 10 cts.

Labor Saving Devices on Concrete Pavements. 200 words. Municipal Journal, August 2. 10 cts.

Resurfacing Old Concrete with New. Method in use in Wayne County, Mich. 500 words. Municipal Journal, August 9. 10 cts.

Construction Work on Du Pont Road. Stone and sand delivered in measuring boxes by industrial railway direct from railroad to mixer, eliminating wheelbarrow work. No expansion joint provided. Fresh concrete is protected by muslin screens. Nine ills. 1,800 words. Municipal Journal, August 2. 10 cts.

Concrete Paving on Connecticut Highway. Sand hauled during the previous winter. Elevating loaders and bins used in loading trucks and industrial cars. Equipment used. 2 ills. 1,250 words. Municipal Journal, August 1 10 cts.

Methods of Installing Expansion Joints. 2 ills. 500 words. Engineering and Contracting, August 1. 10 cts.

Up-to-date Concrete Road Construction. Constructing the DuPont road. 4 ills. 600 words. Contracting, August. 20 cts.

Removing Excess Water from Pavement Concrete. Tests show improved quality of material when surplus moisture is rolled out. From a paper by A. N. Johnson. 2,000 words. Concrete, August. 20 cts.

Concrete Road-Building in Orange County, California. Method of construction described. By J. M. Brown. 8 ills. 1,250 words. Good Roads, August 4. 10 cts.

Construction:

Constructing the Storm King Road. Methods of construction where roadway has to be blasted in rock cliff 400 feet above the Hudson river. Compressed air used for power purposes. Protecting railroad track along river from falling debris. By A. C. Perkins. 8 ills. 1,800 words. Municipal Journal, August 23. 10 cts.

Cost of Constructing Pavements in St. Paul by Force Account. One-half page. Municipal Journal August 23. 10 cts.

Some Road Grading Wrinkles. Street grading with wheel scrapers and steam shovel. Road roller hauls scarifier and scraper. Removing trees. 800 words. Municipal Journal, August 2. 10 cts.

Air Drills for Removing Pavement Surfaces. Use by 4 cities in making cuts in bituminous and concrete pavement. Tools used and some costs. 3 ills. 1,200 words. Municipal Journal, August 16. 10 cts.

Road Building in North Carolina During the War. Changes due to war. Type of road being built. From a paper by Joseph Hyde Pratt. 1,500 words. Good Roads, August 18. 10 cts.

Street Grader with Rotary Cutter Loads 250 Wagons a Day. 6 ills. 1,000 words. The Contractor, August 17. 10 cts.

Type of Shallow Grader Successful on Cook County Roads. 4 ills. 1,000 words. The Contractor, August 17. 10 cts.

Military Road Construction at Mount Gretna, Pa. 4 ills. 1,000 words. Engineering and Contracting, August 1. 10 cts.

State Force Builds 2 Miles of Military Road a Week. Slag piles used to hasten work. Much machinery used. 6 ills. 1,000 words. The Contractor, August 3. 10 cts.

Principles to Be Observed in Building of Federal Aid Roads. By J. W. Howard. 2,000 words. Good Roads, August 18. 10 cts.

Convict Labor:

Convict Labor Proves Effective on California Roads. Difficult construction in rough territory done at low cost. No armed guards. 700 words. Engineering News-Record, August 9. 15 cts.

Road Work with Convicts in Iowa. Results of 3 years' experience. Costs. Where convicts may be used advantageously. 1,000 words. Municipal Journal, August 16. 10 cts.

Prison Labor and Slag Surfacing Solve Ohio Road Problem. Mahoning County overcomes labor shortage by using convicts. Blast furnace slag makes good surfacing. 2 ills. 1,000 words. Engineering News-Record, August 30. 15 cts.

Design:

The Type of Road. Factors governing the selection. By Rodman Wiley. 1,200 words. Good Roads, August 4. 10 cts.

The Selection of Pavements. From a paper by W. A. McLean. 1,100 words. Good Roads, Sept. 1. 10 cts.

Finance:

Serial Bonds for Road Building Save Money. Tables and diagrams show that sinking fund and annuity methods cost taxpayers many millions. By M. O. Eldridge, Office of Public Roads and Rural Engineering. 5 ills. 4,000 words. Engineering News-Record, August 30. 15 cts.

Permanent Assessment Boards. To act in street opening and widening cases. Laws and practices in eight large cities. Proposed law for St. Louis. By Andrew Linn Bostwick. 1,200 words. Municipal Journal, August 30. 10 cts.

General:

Report Forms for Inspectors of Milwaukee County Highway Department. 3 ills. 500 words. Engineering and Contracting, August 1. 10 cts.

Viaduct for Grade Separation at Park Avenue and 42d Street, New York City. 1 ill. 1,200 words. Good Roads, August 25. 10 cts.

How the Surface of a Road Affects Tractive Effort. Unsurfaced concrete gives best results in California tests with steel tired wagons. Various surfaces compared. 5 ills. 1,200 words. Engineering News-Record, August 23. 15 cts.

New York Road Building Suffers from Sins of Past. Some contractors threw up work which state must finish at present high prices. 1,200 words. Engineering News-Record. August 2. 15 cts.

Construction Costs Reduced by Freight Bureau. New York Highway Department gives contractors asistance in getting road materials. 1,000 words. Engineering News-Record, August 9. 15 cts.

Irregular Street Intersection Area Calculations Simplified. By R. B. Gladding. 2 ills. 800 words. Engineering News-Record, August 9. 15 cts.

Grade Crossings:

Mechanical Means for Safeguarding Grade Crossings. 2 ills. 500 words. Engineering and Contracting, August 1. 10 cts.

Granite:

Using Old Stone Paving Blocks. Used for temporary pavement in Cleveland. 350 words. Municipal Journal, August 23. 10 cts.

Legal:

The Connecticut Motor Law. 3,500 words. Good Roads, August 18. 10 cts.

Massachusetts State Road Laws Codified. 5,000 words. Good Roads, September 1. 10 cts.

New Road Laws of Florida. 3,500 words. Good Roads, August 4. 10 cts.

Machinery:

Home-Made Unloaders Save Time on California Road Work. 1 ill. 600 words. Engineering News-Record, August 30. 15 cts.

Machinery on a New York Highway Grading with plow and scraper. Motor truck hauls and spreads stone, also hauling oil during the night. Rollers used as tractors. By W. Hardenbergh. 4 ills. 1,800 words. Municipal Journal, August 2. 10 cts.

Modern Road-Making Machinery. Care and use of machinery and the types and capacities of machines to be used on various kinds of construction. From a paper by W. Huber. 1,750 words. Municipal Journal, August 2. 10 cts.

Haulage Methods and Cost on Ohio Road Work. 600 words. Municipal Journal, August 9. 10 cts.

Caterpillar Tractor on Road Work. Some costs are given. 300 words. Municipal Journal, August 2. 10 cts.

Pneumatic Outfit Replaces Five Gangs Trenching Asphalt with Sledge and Wedge. 2 ills. 750 words. The Contractor, August 3. 10 cts.

Compressed Air in Street Excavation and Tamping. Drills and picks used in removing rock, concrete and macadam. Excavating and tamping trenches. By H. L. Hicks. 3 ills. 1,500 words. Municipal Journal, August 2. 10 cts.

Industrial Railways. Comparison as to efficiency and cost with motor trucks, tractors and teams. Use in highway work in 2 states. 2 ills. 1,200 words. Municipal Journal, August 2. 10 cts.

Maintenance:

Methods of Road Maintenance in Montgomery County, Alabama. From address by Thomas Edwards, County Engineer. 1,200 words. Good Roads, August 18. 10 cts.

Causes of Spring Breakups of New York State Highways. 758,000 sq. yds. of pavement broke through under traffic. Causes and method of repair. 1,250 words. Engineering and Contracting, August 1. 10 cts.

The Maintenance of Gravel Roads. Dragging; patching; resurfacing. By F. F. Rogers, State Highway Commissioner of Michigan. 1,200 words. Good Roads, August 25. 10 cts.

Materials:

Physical Tests for the Materials Used in Building Gravel and Sand-Clay Roads. By R. M. Green. 4,000 words. Good Roads, August 18. 10 cts.

Tests of Concrete Road Aggregates. 1,500 words. Engineering and Contracting, August 1. 10 cts.

Oiling:

Oiling Roads in Iowa. Oil recommended by highway commission. 300 words. Municipal Journal, August 9. 10 cts.

Pavements:

Pavement Problems on New York Bridges. From data prepared by Edward A. Byrne. 3 ills. 3,000 words. Municipal Engineering, August. 20 cts.

Street and Road Pavements. Their design and construction, with special reference to the concrete road. 6 ills. 2,500 words. Municipal Engineering, August. 25 cts.

Paving and Road-Building. Experience in Ann Arbor, Mich., during the past twenty years. From a paper by Manley Osgood, City Engineer. 2,800 words Good Roads, August 11. 10 cts.

Street Expenditures and Street Plans. From a report by W. A. McQueen 2,000 words. Good Roads, August 4. 10 cts.

Cleveland United in Good-Paving Program. City has plan for spending $10,000,000 in municipal improvements. By N. C. Rockwood. 2 ills. 3,000 words. Engineering News-Record, August 2. 15 cts.

Sand-Clay:

Construction of Sand-Clay Roads. Selection and proportion of material. Construction of surface. From a bulletin from the Department of Agriculture. 1,100 words. Contracting, August, 20 cts.

Sidewalks:

Pebble Surface Sidewalk. 800 words. Concrete, August. 20 cts.

State:

State Highway Work in Oregon. 5 ills. 3,500 words. Good Roads, August 11. 10 cts.

Traffic:

Asphalt Pavement Carries Heavy Traffic. 5th Ave. and 42d St. has heaviest traffic. Mixture. 500 words. Municipal Journal, August 9. 10 cts.

Extraordinary Traffic and Excessive Weights on Highways. Causes of damage to road. By H. T. Wakelam, County Engineer, Middlesex. 5,000 words. The Surveyor, June 29. 40 cts.

Extraordinary Traffic and Excessive Weights on Highways. Discussion by institution of municipal and county engineers. 3,000 words. The Surveyor, July 6. 40 cts.

Extraordinary Traffic and Excessive Weights on Highways. Further discussion by institution of municipal and county engineers. 5,000 words. The Surveyor, July 13. 40 cts

SEWERAGE AND SANITATION.

Activated Sludge:

Dewatering Activated Sludge at Urbana Sewage Station. Rotary filter and especially designed centrifuge among devices tried. The latter gave 88 per cent. moisture sludge. 800 words. Engineering News-Record, August 9. 15 cts.

Activated Sludge Process of Sewage Purification. The Worcester experiment. By Thomas Caink, City Engineer. 1 ill. 7,000 words. The Surveyor, July 20. 40 cts.

The Activated Sludge Process of Sewage Disposal. Results at Worcester, England. 1,800 words. The Surveyor, July 27. 40 cts.

Cleaning:

Sewer Cleaning in Aberdeen. 300 words. Municipal Journal, August 2. 10 cts.

Cleaning Sewers in Holland, Mich. By R. B. Champion. 600 words. Municipal Journal, August 30. 10 cts.

Concrete:

Concrete Sewer Pipe in Los Angeles. A letter from E. P. Bent. 1,000 words. Concrete, August. 20 cts.

Precast Concrete Pipe Plant Composite of Several Small Special Devices. Funnel buckets, sugar scoop barrows, wood steaming jacket and double cross form are essential time saving features. 7 ills. 1,000 words. The Contractor, August 31. 10 cts.

Construction:

Shovel Saves Labor in Laying Big Concrete Pipe. Trench is excavated by shovel and clam shell and pipe laid by shovel. 1 ill. 1,000 words. Engineering News-Record, August 23. 15 cts.

Trench and Tunnel Excavation. Various methods in use. By J. F. Springer. 7,000 words. Municipal Engineering, August. 25 cts.

Tunneling Costs Less Than Trenching. Detroit builds both big and little sewers in tunnel. Tunneling costs less than trenching where depth is greater than 20 feet and ground is stable. Tunneling machines increase speed for larger diameters. 5 ills. 3,000 words. The Contractor, August 3. 10 cts.

Sewer Tunnelers Average 4 Inches Per Man Per Day. Electric-driven compressors and hoists. Excavation by night shifts keeps street clear in day time. 5 ills. 1,500 words. The Contractor, August 3. 10 cts

Sewer Construction in Camden. Three jobs now being completed. 5 ills. 850 words. The Contractor, August 17. 10 cts.

Wooden Sewer Form Units 45 Ft. Long Moved Easily on Castors. Saw mill on job cuts lumber for big sewer forms. Traveling gravity mixer places invert concrete. Wire rope blasting mats protect water mains only a few feet away. 3 ills. 1,100 words. The Contractor, August 31. 10 cts.

Sewer Work in Rock and Quicksand. Comparative bids on brick and segment block sewer in St. Louis. Excavating by clam shell and trench machines. Handling trench in quicksand. By W. E. Hardenburg. 3 ills. 1,500 words Municipal Journal, August 9. 10 cts.

Work on Calumet Intercepting Sewer. Excavating in quicksand and clay with steam shovel and drag line. Handling excavated material and concrete aggregate. By A. R. Reilly. 1,100 words. Municipal Journal, August 23. 10 cts.

Building a Big Pipe Sewer in Columbus. 3 ills. 1,000 words. Concrete, August. 20 cts.

General:

Retaining Dams Prevent Overflow of Sewers at Binghamton. Sidehill streams which used to fill with debris and cause floods now controlled by dams and paved channels. By W. Earl Weller, City Engineer. 5 ills. 1,500 words. Engineering News-Record, August 2. 15 cts.

Handling Stone for a Sprinkling Filter. Details of Method at sewage disposal plant at Fort Benjamin Harrison. Force employed and amount moved daily. 1 ill. 1,500 words. Municipal Journal, August 30. 10 cts.

Objectionable Features of Sprinkling Filters and the Cause. Reports from 14 cities. 2,200 words. Engineering and Contracting, August 8. 10 cts.

Operation:

Operating Methods at Chain of Rocks Filter Plant, St. Louis, Mo. 3,000 words. Engineering and Contracting, August 8. 10 cts.

Sewage Disposal at Fitchburg. Report on operation during 1916. Growths and ice on filters. Handling sludge. 2,000 words. Municipal Journal, August 23. 10 cts.

Segment Block:

Segment Block Sewer Fails. Two breaks occur in 4-ft. sewer. Probably due to poor shaping of bottom of trench. By S. U. Misner. 1 ill. 600 words. Engineering News-Record, August 2. 15 cts.

Sewers:

Manhole for Separate Sewers in Same Trench. 3 ills. 800 words. Municipal Journal, August 23. 10 cts.

Sewerage System of Daytona. Complete collection on treatment system. Screening, chlorine disinfection and pumping of sewage. 14 ejectors, operated by compressed air at several stations. By Geo. A. Main. 2 ills. 2,800 words. Municipal Journal, August 30. 10 cts.

Treatment Plants:

Changes in Cleveland Sewage Disposal Plans Recommended. Fine screens are advised by Fuller after adverse report by other engineers. Will be treated with chlorine in summer at two plants. Sprinkling filters and Dortmund tanks at other plant. 5,500 words. Engineering News-Record, August 16. 15 cts.

Modern Sewage Purification Works, Design, Construction and Management. By Chas. Terry, 2,800 words. The Surveyor, June 29. 40 cts.

Remodeling Small Sewage Works in California. Stream pollution suit leads to replacing makeshift filter with sprinkling filter. Final settling tank added. 2 ills. 1,000 words. Engineering News-Record, August 30. 15 cts.

Wastes:

Purification of Tannery Wastes. Results of study of method of purifying liquid waste from representative plant of several industries. 4,000 words. Engineering and Contracting, August 8. 10 cts.

WATER SUPPLY.

WATER SUPPLY

Construction:

Machine Trenching for Water Pipes. Syracuse Municipal Water Department owns machine which it uses for all trenching for water pipes. Record of 13 days' run. By H. C. Allen, City Engineer. 1 ill. 800 words. Municipal Journal, August 2. 10 cts.

Build Concrete Shell Around Tall Steel Water Tanks. Panel forms and staging held by bolts and raised from floats. Concreting was nearly continuous. Road was built for delivery of material. 3 ills. 1,500 words. Engineering News-Record, August 16. 15 cts.

Submerged Water Main Linked up on River Bank and Floated Across. Displaced water nearly supports 12-inch cast iron pipe line. 1 ill. 600 words. The Contractor, August 3. 10 cts.

Dams:

Island Lake Storage Dam Has Immense Log Sluice Description of dam. 3 ills. 2,000 words. Engineering News-Record, August 2. 15 cts.

Tunnel from Below to Build Diversion Dam. 3 ills. 1,600 words. Engineering News-Record, August 30. 15 cts.

Concrete Dam 17 Feet High Has Automatic Plug Gates. Describes dam at Nashua, Iowa. 2 ills. 1,500 words. Engineering News-Record, August 9. 15 cts.

Australian Concrete Dam Impounds Billions of Brisbane. Structure is 125 feet high and filled with rock plums. Face is of rich concrete reinforced. By John Peart. 3 ills. 600 words. Engineering News-Record, August 9. 15 cts.

General:

Water Hammer Formulas. 1,200 words. Engineering News-Record, August 16. 15 cts.

Color Records Applied to Potable Water. By J. S. Pickering. 3 ills. 5,000 words. The Surveyor, July 6. 40 cts.

Power and Water Bureau Shops of Los Angeles. Municipal warehouse, machine shops and central receiving station. Testing electric meters. By C. W. Geiger. 4 ills. 2,000 words. Municipal Journal, August 9. 10 cts

Filtros Plates Made Best Showing in Air-Diffuser Tests 800 words. Engineering News-Record, August 9. 15 cts.

Cost of Chemicals for Chain of Rocks Filter Plant. 1,250 words. Engineering and Contracting, August 8. 10 cts.

Unloading Pipe from Gondola Cars by Motor Truck. 600 words. Engineering and Contracting, August 8. 10 cts.

Traveling Field Laboratory of New Jersey State Health Department. 2 ills. 1,000 words. Engineering and Contracting, August 8. 10 cts.

Recent Progress and Tendencies in Municipal Water Supply in the United States. From a paper by John W. Alvord. Continued from former issue 1,800 words. Fire and Water Engineering, August 1. 10 cts.

Meters:

As Water Meters Increase, Water Consumption Falls. Statistics from 68 cities. 1,000 words. Engineering News-Record, August 16. 15 cts.

Operation:

Imperfect Washing of Filter Causes Aftergrowths. Probably due to accumulation of sand in the under drain. 800 words. Engineering News-Record, August 9. 15 cts.

Operating the St. Louis Filters. Adjusting and testing meters and gauges. Determining details of filter washing. Mixing and applying chemicals. 3,500 words. Municipal Journal, August 16. 10 cts.

Pipe:

Cast Iron Pipe Prices During the Past Fifty Years. 2¼ pages. Engineering and Contracting, August 29. 10 cts.

Pollution:

Finding and Stopping Pollution of Austin Water Supply. Surface drainage and lack of sewers chief source of infection. By Julian Montgomery. 1 ill. 1,600 words. Engineering News-Record, August 23. 15 cts.

Pumping:

Large Capacity Deep Well Irrigation Pumping Installation in Texas Panhandle. 5 ills. 750 words. Engineering and Contracting, August 8. 10 cts.

Service Charge:

Service Charge—How Constituted. From a paper by J. N. Chester. 1,250 words. Fire and Water Engineering, August 8. 10 cts.

Supply:

Drainage—Basin and Crop Studies Aid Water Supply Estimates. In this article is described a new kind of survey and the use of data derived therefrom. By R. E. Horton. 3,500 words. Engineering News-Record, August 23. 15 cts.

Rational Study of Rainfall Data Makes Possible Better Estimates of Water Yield. Suggest what improvements over common practice are advisable in the use of rainfall data. By Robt. E. Horton. 2 ills., 2,500 words. Engineering News-Record, August 2. 15 cts.

Vitrified:

Joint Leakage in Vitrified Pipe Line. From a paper by W. W. Brush. 5 ills.

2,500 words. Municipal Engineering. August. 25 cts.

Waste:

Water Waste Prevention in Cork. Results of efforts to decrease waste and results. By J. F. Delany, City Engineer. 4 ills. 1,000 words. The Surveyor, July 27. 40 cts.

Waterworks:

Water Works Statistics. Reports from several states. 2 pages. Fire and Water Engineering, August 15. 10 cts.

Water Works Statistics. Reports from Kansas, Kentucky, Louisiana, Maine, Maryland and Massachusetts. Fire and Water Engineering, August 8. 10 cts.

Water Works at Columbus, Ga. 800 words. Fire and Water Engineering. August 16. 10 cts.

Water Supply at Fort Benjamin Harrison Nears Completion. Water is pumped from infiltration well and gallery to concrete reservoir. Is chemically treated. 1 ill. 800 words. Engineering News-Record, August 9. 15 cts.

Ystradfellte Waterworks. Description of plant. By D. M. Davies. 1 ill. 2,500 words. The Surveyor, August 10. 40 cts.

STREET LIGHTING AND POWER.

Road Illumination by Means of Automobile Head Lamps. This article deals with the distribution of light and the intensity of light from the automobile head lamp. The author suggests that regulations governing the glare from head lamps should not only specify the limitations of glare but also what devices can and what devices cannot be made to eliminate glare when properly adjusted and installed. By H. P. Gage. 29 ills. 3,000 words. General Electric Review, September. 20 cts.

Loss of Heat Through Bare Pipes. Formulas for computing loss. By W. F. Schaphorst. 1 ill. 1,000 words. The Gas Age, August 15. 20 cts.

Effect of the War on Street Lighting. Although prices are the highest in the history of the industry and the bond market is not favorable, there will be usual activity. By F. A. Vaughn. 2 ills. 1,250 words. Electrical Review, September 1. 10 cts.

Park Lighting in St. Louis. Standards made by city of concrete and of iron pipe. 2 ills. 700 words. Municipal Journal, August 9. 10 cts.

Method of Laying Submerged Gas Main in Winter. 1,100 words. Engineering and Contracting, August 8. 10 cts.

The Relation of Lighting to Industrial Safety. Close connection between poor lighting and industrial accident. By J. A. Hoeveler. 7 ills, 3,000 words Electrical Review, September 1. 10 cts.

Shortage of Power Raises a Problem. Several cities report power shortages. 1,600 words. Electrical World, August 25. 10 cts.

FIRE.

Salaries of Firemen. Comparison of pay in several cities. 500 words. Fireman's Herald, August 18. 5 cts.

Salaries of Firemen. What they are being paid in cities throughout the country. 500 words. Fireman's Herald, September 1. 5 cts.

Fireman at a Training School. Some of the physical lessons given every week by the Los Angeles Fire Department. 500 words. Fireman's Herald, September 1. 5 cts.

Arguments for Two Platoons. 750 words. Fireman's Herald, August 18. 5 cts.

Shingles under a Blow-Torch. Interesting results of official tests of various materials. 1,000 words. Fireman's Herald, August 18. 5 cts.

Fire Pumps. First of a Series of Articles. 3,000 words. The Fire Engineer, August. 10 cts.

Attack on Two Platoons. Figures of comparative costs of fire service in 10 cities. 1,500 words. Fireman's Herald, September 1. 5 cts.

Cooperative Fire Fighting. The standardization of hose couplings. By E. M. Griswold. 1,500 words. Fireman's Herald, August 4. 5 cts.

The Storage Battery for Fire Alarm Telegraph Systems. By W. A. Tiffany. 1,000 words. Fire and Water Engineering, August 22. 10 cts.

Newport's Fire Department. A report of the National Board of Fire Underwriters. 2,000 words. Fireman's Herald, August 4. 5 cts.

MOTOR VEHICLES.

Electric Vehicles in Municipal Service. Results obtained in Manchester by a 1-ton electric truck. By S. L. Pearce. 2,500 words. The Surveyor, July 6. 40 cts.

Electric Vehicles for City Refuse Collection. Report from Sheffield, England, demonstrates economy of electric over horse-drawn vehicles. 1 ill. 1,200 words. Electrical Review, August 11. 10 cts.

Electrical Vehicles and Their Use in Cleansing Work. Discussion by Institute of cleansing superintendents. 3,000 words. The Surveyor, July 27. 10 cts.

Electric Vehicles and Their Use on Cleansing Work in Sheffield. By J. A. Priestley, Cleansing Superintendent. 1 ill. 4,000 words. The Surveyor, July 13. 10 cts.

Route for Motor Truck Drivers. 500 words. Engineering and Contracting, August 1. 10 cts.

Control of Omnibus and Other Motor Traffic. By H. T. Chapman, County Surveyor, Kent. 2,500 words. The Surveyor, July 27. 40 cts.

Motor Vehicles in Municipal Work. Report from more than 100 cities in regard to use of motor vehicles by the cities. 3½ pages. Municipal Journal, August 2. 10 cts.

Motor Vehicles in Spokane City Work. 54 are used by the city. 13 sprinkler trucks built by the city fire department. By Henry F. Nelthorpe. 2 ills. 2,000 words. Municipal Journal, August 2. 10 cts.

Parking in Cities. Practice of several cities in regard to parking automobiles. 400 words. Municipal Journal, August 9. 10 cts.

State Motor Truck Laws. Charges made by each of the states for trucks of various weights, powers, tire construction, uses, etc. 1,200 words. Municipal Journal, August 30. 10 cts.

CITY PLANNING.

Berkeley, Cal., Zone Ordinance. 2,000 words. Engineering and Contracting, August 1. 10 cts.

Wisconsin Enacts Three Notable Planning Laws. Zoning by city plan commissioners made possible. Street-widening procedure authorized. Building-setback control. By S. J. Williams. 1,000 words. Engineering News-Record, August 2. 15 cts.

STREET CLEANING AND REFUSE DISPOSAL.

Worcester Owns and Operates a Model Garbage Disposal Piggery. City collects garbage and hauls it many miles to poor farm where it is fed to hogs under modern sanitary conditions. Fish offal is buried. Many cost data are given. By Frederick Bonnet, Jr. 8 ills. 3,200 words. Engineering News-Record, August 30. 15 cts.

Springfield Garbage Disposal Report. Past and present methods of disposal in Springfield. Factors in selection of method, income obtainable and amount of garbage. 2,800 words. Municipal Journal, August 9. 10 cts.

Community Piggeries. 300 words. Municipal Journal, August 9. 10 cts.

Cleansing Work at Nottingham. Garbage destructors. Use of clinkers. Other cleansing and disposal work. By J. Terry. 3,000 words. The Supryeyor, July 20. 40 cts.

Street Cleaning in Houston. Motor sprinklers do the work more cheaply than mule-drawn. Costs of sweeping and sprinkling. 1,000 words. Municipal Journal, August 2. 10 cts.

Utilizing Old Tin Cans. 800 words. Municipal Journal, August 30. 10 cts.

BRIDGES.

Automatic Devices Reduce Manual Labor to Minimum on Concrete Bridge. From gravel banks in river pea to concrete in form men merely direct machines which dig, wash, screen, store, convey, mix and place the materials. By V. H. Drufner. 5 ills. 1,100 words. The Contractor, August 31. 10 cts.

Gravity Mixer and Derrick Place Bridge Concrete. Balanced cable cars deliver concrete from derrick charged gravity mixer to derricks hoisting to forms. Pebble surface finish placed with body concrete. 5 ills. 1,900 words. The Contractor, August 31. 10 cts.

Points in Steel Bridge Maintenance. Stronger lateral and portal systems lengthen life of bridge. 5 ills. 1,200 words. Engineering News-Record, August 30. 15 cts.

Test Wells for Alaska Bridge Sunk Through Ice. Wash-drill boring rig is hauled 100 miles. 4 ills. 1,100 words. Engineering News-Record, August 30. 15 cts.

Low Water Concrete Bridges. Type adopted where rivers are dry much of the year and floods last short periods. 1 ill. 500 words. Municipal Journal, August 9. 10 cts.

Approximate Methods Desirable for Arch Design. Will give simple guide to those obtained by full elastic analysis. By J. E. Cox. 1,500 words. Engineering News-Record, August 9. 15 cts.

Bridging Drainage Ditches. Type of structure best suited for use on this work. From a paper by C. E. Jones. 800 words. Municipal Journal, August 31. 10 cts.

Cantilever Concrete Bridge Has Suspended Link. Structure is placed on pile foundation so that settlement or dynamite can affect one pier only. 1 ill. 1,000 words. Engineering News-Record, August 2. 15 cts.

Temporary Hinges Advantageous in Concrete Arch Erection. By D. F. Steinman. 1,000 words. Engineering News-Record, August 2. 15 cts.

Building a Bridge Under Adverse Conditions in San Domingo. Lack of local material and of skilled labor main difficulties. By E. S. Needham. 2 ills. 2,000 words. Engineering News-Record, August 23. 15 cts.

Kentucky Road Department Has Standard Bridges. Standard Designs for state-aid structures. Small spans are concrete girders, large ones steel trusses. 1,300 words. Engineering News-Record, August 9. 15 cts.

Paints for Metal Surfaces. Materials for prevention of rusting. Galvanized and tin surfaces. From a paper by H. A. Gardner. 1,250 words. Municipal Journal, August 30. 10 cts.

Steel Bridge Standards of the Ontario Department of Public Highways. From a paper by George Hogarth, Chief Engineer. 5 ills. 2,000 words. Good Roads, August 25. 10 cts.

GOVERNMENT AND FINANCE.

License Fees in Wisconsin Cities. 1,000 words. Municipal Journal, August 9. 10 cts.

Fundamental Features of a Sound Public Utility Bond. A discussion of the legal, physical and economic considerations which affect the security of a public utility bond. By F. K. Schrader. 5 ills. 5,000 words. Electrical Review, August 11. 10 cts.

MISCELLANEOUS.

Engineer Ousted as City Manager of Portsmouth, Va. Council interferes with and finally discharges manager. 1,600 words. Engineering News-Record, August 2. 15 cts.

Method and Cost of Thawing Frozen Ground with Steam. 800 words. Engineering and Contracting, August 8. 10 cts.

Valuation and Appraisal of Public Service Property. One of a series of articles on valuation for rate making. By A. S. B. Little. 2,500 words.. The Gas Age, August 1. 20 cts. 2,500 words. August 15. 20 cts.

Cost Plus Percentage Form of Contract of Bureau of Yards and Docks. 2,800 words. Engineering and Contracting, August 29. 10 cts.

Trend of Wages of Common Labor from 1906 to 1917. 1 ill. 600 words. Engineering and Contracting, August 29. 10 cts.

Price Changes for Common Labor and Construction Material During the Past Year. Prevailing figures from various cities throughout the country. 1 page. Engineering and Contracting, August 29. 10 cts.

Topographic Map for Beverly. 600 words. Municipal Journal, August 30. 10 cts.

Camp Management Helps to Solve California Labor Problems. Desirable men attracted by good food and living conditions rather than by prospect of easy

(Continued on page 276.)

NEWS OF THE SOCIETIES

Calendar of Meetings.

Sept. 10-15.—NATIONAL EXPOSITION OF SAFETY AND SANITATION. Annual conference, New York, N. Y. Secretary, W. C. Cameron, Continental and Commercial Bank building, Chicago, Ill.

Sept. 11-13.—AMERICAN ASSOCIATION OF PARK SUPERINTENDENTS. Annual convention, St. Louis, Mo. Secretary, Roland W. Cotterill, 533 City Hall, Seattle, Wash.

Sept. 11-14.—AMERICAN ASSOCIATION OF PORT AUTHORITIES. Annual convention, Cleveland, O. Secretary, W. T. Barney, 29 Broadway, New York, N. Y.

Sept. 11-14.—INTERNATIONAL ASSOCIATION OF MUNICIPAL ELECTRICIANS. Annual convention, Niagara Falls, N. Y. Secretary, Clarence R. George, Houston, Tex.

Sept. 11-14.—NEW ENGLAND WATERWORKS ASSOCIATION. Annual convention, Hartford, Conn. Secretary, Willard Kent, 715 Tremont Temple, Boston, Mass.

Sept. 18-20.—LEAGUE OF IOWA MUNICIPALITIES. Annual convention, Iowa City. Secretary, Frank G. Pierce, Marshalltown, Ia.

Sept. 18-20.—LEAGUE OF VIRGINIA MUNICIPALITIES. Annual convention, Lynchburg, Va. Secretary, L. C. Brinson, Portsmouth, Va.

Sept. 19-20.—UNION OF ALBERTA MUNICIPALITIES. Annual convention, Calgary, Alberta. Secretary, J. D. Saunders, Camrose, Alberta.

Sept. 24-28.—CALIFORNIA CONFERENCE ON CITY PLANNING. Annual conference, Santa Rosa, Cal. Secretary, Charles H. Cheney, Crocker Building, San Francisco, Cal.

Sept. 24-29.—LEAGUE OF CALIFORNIA MUNICIPALITIES. Annual convention, Santa Rosa, Cal. Secretary, Wm. J. Locke, Pacific Building, San Francisco, Cal.

Sept. 24-29.—THIRD NATIONAL EXPOSITION OF CHEMICAL INDUSTRIES. Exposition, Grand Central Palace, New York City.

Sept. 25-27.—SMOKE PREVENTION ASSOCIATION. Annual convention, Columbus, O. Secretary, Frank A. Chambers, City Hall, Chicago, Ill.

Sept. 25-27.—LEAGUE OF WISCONSIN MUNICIPALITIES. Annual convention, Racine, Wis. Secretary, Ford H. MacGregor, Madison, Wis.

Sept. 27, 28.—CANADIAN PUBLIC HEALTH ASSOCIATION. Annual congress, Ottawa, Ont. Secretary, J. G. Fitzgerald, M. B., Toronto, Ont.

Sept. 27-29.—AMERICAN AND CANADIAN ENGINEERS AND ARCHITECTS OF NORWEGIAN BIRTH OR DESCENT. Informal congress and re-union, Chicago Norske Klub, Chicago, Ill. Chairman, Committee on Arrangements, Joachim G. Giaver, consulting engineer, Chicago, Ill.

Oct. 10.—UNION OF BRITISH COLUMBIA MUNICIPALITIES. Annual convention, Duncan, B. C. Secretary, Ex-Reeve H. Bose, Survey Center, B. C.

Oct. 15-17.—NATIONAL HOUSING ASSOCIATION. Annual conference, Hotel La Salle, Chicago, Ill. Secretary, Lawrence Veiller, 105 East 22d St., New York City.

Oct. 16-19.—LEAGUE OF KANSAS MUNICIPALITIES. Annual convention, Wichita, Kan. Secretary, Homer Talbot, University of Kansas, Lawrence, Kan.

Oct. 17-18.—LEAGUE OF MINNESOTA MUNICIPALITIES. Fifth annual convention, St. Cloud, Minn. Secretary-treasurer, Richard R. Price, University of Minnesota, Minneapolis.

Oct. 17-19.—AMERICAN PUBLIC HEALTH ASSOCIATION. Annual meeting, Washington, D. C. Acting Secretary, A. W. Hedrick, 126 Massachusetts Avenue, Boston, Mass.

Oct. 22-24.—AMERICAN CIVIC ASSOCIATION. Annual meeting, St. Louis, Mo. Secretary, Richard B. Watrous, 914 Union Trust building, Washington, D. C.

Oct. 28-30.—TEXAS CONFERENCE ON SOCIAL WELFARE. Annual convention, Houston, Texas.

Nov. 19-24.—CITY MANAGERS' ASSOCIATION. Annual meeting, Detroit, Mich. Secretary, W. L. Miller, City Manager, St. Augustine, Fla.

Nov. 20-23.—PLAYGROUND AND RECREATION ASSOCIATION OF AMERICA. Recreation Congress, Milwaukee, Wis. Secretary, H. S. Braucher, 1 Madison Ave., New York, N. Y.

Nov. 21-24.—NATIONAL MUNICIPAL LEAGUE. Twenty-third annual meeting, Hotel Statler, Detroit, Mich. Secretary, Clinton Rogers Woodruff, 703 North American Bldg., Philadelphia, Pa.

Jan. 15-17.—VIRGINIA GOOD ROADS ASSOCIATION. Seventh annual convention, Richmond, Va. Secretary, C. B. Scott, Richmond, Va.

Feb. 6-13.—FIRST CHICAGO CEMENT MACHINERY AND BUILDING SHOW. Supersedes annual Chicago Cement Show. Held at the Coliseum, under direction of the National Exhibition Co.

The American Public Health Association.

A war meeting will be held at Washington, D. C., Oct. 17-20, 1917, by the American Public Health Association. This will replace the annual meeting which was to be held at New Orleans, La., Dec. 4-7, 1917.

The papers and conferences will deal largely with the health problems created by the Great War—the food supply, communicable diseases among soldiers, war and venereal disease, war and the health of the civil population, etc.

Washington will be crowded and those interested are urged to reserve hotel accommodations at once. It will be easy to cancel reservations; but it may be impossible to obtain rooms at the last moment. Any hotel or railroad can give a list of Washington hotels.

Preliminary programs will be automatically mailed to all members of the A. P. H. A. about Sept. 15. Non-members may receive them free by writing to The American Public Health Association, 128 Massachusetts avenue, Boston, Mass.

National Municipal League.

In connection with the National Municipal League meeting at Detroit, November 21-23 inclusive, the following divisions of its activities and associations will meet with it: Intercollegiate Division of N. M. L., Association of Governmental Research Agencies, Society for the Promotion of Training for Public Service, Civic Secretaries, City Managers' Association.

National Association of Purchasing Agents.

The National Association of Purchasing Agents will hold its 1917 convention at the William Penn Hotel, Pittsburgh, Pa., October 9, 10 and 11. This hotel is to be convention headquarters, where all sessions and gatherings, public and closed will be held, including the annual banquet. Men of national prominence are to be present as speakers. The details of the convention are being arranged by Robert F. Blair of Pittsburgh Gage & Supply Company. The president of the National Association is E. L. McGrew, of Standard Underground Cable Company. An attendance of 1,500 members is expected. This meeting assumes importance, as the association is being recognized as a clearing house of information of interest to purchasing agents and the houses which they represent.

National Electrical Contractors' Association.

The annual convention of the National Electrical Contractors' Association will be held on Oct. 10 to 13 at New Orleans, La. H. C. Brown, Utica, N. Y., is secretary of this association.

American Electrochemical Society.

The next meeting of the American Electrochemical Society will be held at Pittsburgh, Pa., Oct. 3 to 6. One of the features of this meeting will be a session devoted to the application of electrochemistry and electric furnaces to the manufacture of war supplies and munitions. An address by Alex Dow, president of the Detroit Edison Company, on "Production of Steam from Coal," will be another of the features of this meeting.

Kansas Public Service Association.

This association will hold its annual meeting at Salina, Kan., Oct. 19 and 20. W. W. Austin, Cottonwood Falls, Kan., is secretary.

Albemarle Highway Association.

At the annual meeting of the Albemarle Highway Association, held at Charlottesville August 29, officers were elected for the ensuing year as follows: Milton C. Elliott, of Washington, D. C., president; George Austen, Ralph Ortman, Russell Bargamin, C. A. Greens, Frank Y. Hall, Prof. Wm. H. Echols and William H. Wood, vice-presidents; A. G. Burnett, secretary; S. S. Teel, Treasurer. The directors at large are: Hellis Rinehart, Wm. R. Duke, Samuel M. Page, E. D. Taylor, and J. E. Shepherd.

League of Iowa Municipalities.

The committee in charge of the preparations for the 20th annual convention of the League of Iowa Municipalities has just made public the complete program, beginning Tuesday, Sept. 18, and continuing three days and evenings.

At this meeting many subjects of great importance will be discussed by men who have made a study of the subjects and are prepared to speak with authority. The entertainment to be furnished by the Iowa City entertainment committee will be unique and it is hoped will be enjoyed by all present. A large attendance is anticipated.

The short course for health officers of the state will be held coincident with the state meeting of the League of Iowa Municipalities, Sept. 18 to 22. This is the first time in the history of the state that health officers have been provided with anything along this line

of instruction and a large attendance is anticipated.

The annual meeting of the League of Municipalities is regarded of such importance, that under the present state law, the expenses of the delegates from each city or town, may be paid out of the public treasury. The health officers' short course is of equal importance in providing the county, city and township officers with a knowledge not only of what to do to guard the public health, but how to go about it and what legal authority they have and what co-operation may be expected or demanded at the hands of the police officers or sheriffs of the state.

In many cases it is thought cities and towns will name their health officers as delegates to the municipal convention in order that they may also attend the health officers' course of lectures.

Oregon Electrical Contractors and Dealers.

The second annual convention of the Oregon Association of Electrical Contractors and Dealers will be held at Eugene, Ore., September 17-18. Among the addresses will be one on "Business Methods and Outlook" by C. D. Roer, president of the Bank of Commerce, Eugene; on "Oregon's Electrical Industry" by Franklin T. Griffith, of Portland, president, Portland Railway, Light & Power Company; "The Need of Proper Electrical Inspection and How to Organize an Electrical Inspection Department" by I. F. Dunlap, chief electrical inspector, Bureau of Buildings, Portland; "The Electrical Jobber," by J. J. Colwell, northwest manager, Western Electric Company, Seattle.

PERSONALS

Bates, George, has been made chief of the fire department of Cheyenne, Wyoming, succeeding T. A. McCleave.

Battle, Dr. W. W., has been appointed city chemist of Dallas, Texas, succeeding Dr. N. C. Hamner, who has resigned after six years of service.

Brown, R. T., formerly highway engineer for Davidson company, N. C., has been appointed assistant engineer with the South Carolina Highway Department.

Darlington, E. B., chief engineer and superintendent of the Salmon River Irrigation Project, Idaho, has been appointed chief engineer of the Twin Falls Northside Land and Water Co. Irrigation Project, succeeding C. R. Burkey, who has resigned to attend the Officers' Training Camp at Presidio.

Durney, Dr. Edward, has been appointed deputy health commissioner of Buffalo, to act during the absence on military duty of Dr. A. C. Schaefer.

Forbess, Miss Elba, has been appointed recreation supervisor for Fort Worth, Texas.

Hoffman, J. D., has been appointed professor of practical mechanics at Purdue University. Mr. Hoffman has been in charge of the department of mechanical engineers of the University of Nebraska, since 1911.

The firm of Geo. B. Post & Sons, architects, and the organization headed by Ernest P. Goodrich, engineer, with headquarters in New York, have become associated professionally in the practice of architecture, engineering and planning. The architect's office is at 101 Park Avenue, and the engineer's office at 261 Broadway, New York City. The object of the closer association between the two organizations is to permit of a wider latitude of practice and more intensive co-operation in the design and execution of engineering and architectural works in general, and in particular in city planning, workingmen's housing and industrial developments.

Geo. B. Post & Sons have been the architects for many prominent buildings in this country, among them the Wisconsin State Capitol, the College of the City of New York, the New York Stock Exchange, the Prudential Life buildings in Newark, the Statler hotels in Cleveland, Detroit and St. Louis, and numerous banks, office buildings, hospitals, and other structures in New York and other parts of the country.

Ernest P. Goodrich is a consulting engineer of national reputation and has served as consulting engineer to New York City, Newark, Portland, Ore., and many other municipalities. He is the designer of the Bush Terminal in South Brooklyn and is the director of the Bureau of Municipal Research. A. Pearson Hoover, associate of Ernest P. Goodrich, is an authority on grade crossing elimination and industrial developments, and is the engineer for the Paterson (N. J.) Industrial Development Company.

George B. Ford, of the firm of Geo. B. Post & Sons, has served as consultant on city planning to a score of cities in America. In all of this work he has cooperated with Mr. Goodrich, and together they have made city planning investigations or prepared plans for Jersey City, N. J., Newark, N. J., Omaha, Neb., East Orange, N. J., Mansfield, Ohio, and a number of other places.

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

STREET IMPROVEMENTS are being made by Ladd, Ill. The engineer for the work is S. D. Porter, 605 Gooding Street, La Salle, Ill.

A WATERWORKS SYSTEM is to be built by Towanda, Kans. Plans and specifications were prepared by F. E. Devlin, Eldorado, Kans.

Bids are being received by Luray, Kans., on machinery for an ELECTRIC LIGHT plant and WATERWORKS improvements. In preparing the plans, the city called upon George C. Shaad, Lawrence, for advice.

Elm Grove, W. Va., is making a number of STREET IMPROVEMENTS. The engineer for the work is H. L. Maddocks, 405 Newark Trust Building, Newark, Ohio.

Pickens County, Carrolton, Ala., is making extensive ROAD and BRIDGE improvements. The engineer for the projects is G. E. Hauser, First National Bank Building, Columbus, Miss.

Cambria County, Pa., is to construct a reinforced concrete BRIDGE, following the preparation of plans by the consulting engineer, J. L. Elder, Jr., Ebensburg, Pa.

A SEWER SYSTEM and DISPOSAL PLANT are to be built by Rocky River, Ohio. The consulting engineer for the improvement is R. Winthrop Pratt, Hippodrome Building, Columbus, Ohio.

The Fabius River drainage district, Quincy, Ill., in carrying out new DRAINAGE work, had the plans prepared by the E. T. Perkins Engineering Co., 38 South Dearborn Street, Chicago, Ill.

The village of Rice, Minn., is to build an ELECTRIC LIGHT PLANT. The architect and engineer for the improvement is L. W. Schaefer, St. Cloud, Minn.

Estherville, Iowa, is receiving bids for constructing SEWERAGE systems from plans prepared by K. C. Gaynor, 405 Frances Building, Sioux City, Iowa.

Du Bois, Pa., is to build a new BRIDGE. The engineer for the proposed improvement is G. A. Flink, 301 Commonwealth Trust Building, Harrisburg, Pa.

SEWAGE DISPOSAL WORKS are to be constructed by Stamford, Conn. Plans and specifications for the plant have been completed by the consulting engineers, Fuller & McClintock, 170 Broadway, New York, N. Y.

The city of Dayton, Ohio, in preparing plans for a concrete RESERVOIR, called upon Metcalf & Eddy, 14 Beacon Street, Boston, Mass., and Harris Trust Building, Chicago, as consulting engineers.

A SEWERAGE SYSTEM and DISPOSAL WORKS, to cost $350,000, are to be built by Greenwich, Conn. The city has retained Clyde Potts, 30 Church Street, New York, N. Y., as consulting engineer.

Floydada, Tex., is receiving bids on about 20,000 sq. yards of PAVEMENTS. The work also contemplates designs for STORM and SANITARY SEWERS, which are not to be installed at this time. Henry E. Elrod, Interurban Bldg., Dallas, has been retained by the city as consulting engineer.

NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

EASY PIPE PUSHER.

For Economy in Underground Service Work.

In installing sewer, water, gas, electric and telephone services and laying cable for street lighting and police and fire alarm circuits, the digging up of the street results in much labor and cost and is frequently responsible for badly repaired pavements and litigation. The constant tearing up of newly laid pavements for putting in utility connections has become proverbial. Much of this work has been accepted as a necessary evil. The Easy pipe pusher has been devised to eliminate a large proportion of the need of digging. It is claimed to be able to put in 30 to 150 feet of pipe, at almost any depth, in an hour. From 75 to 85 per cent of the digging is obviated.

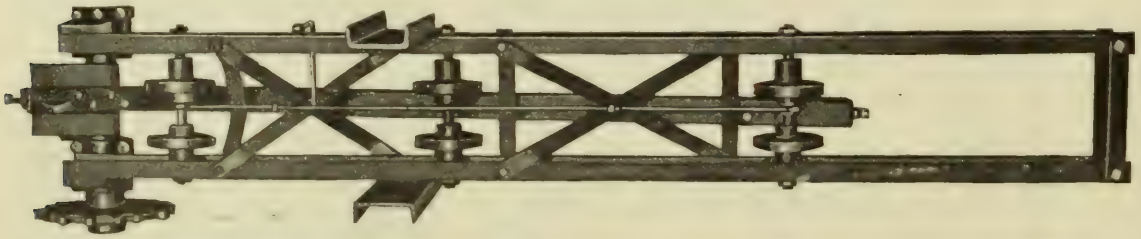
The cog drive principle is used in this device for pushing power. The machine rolls on track, and there is no friction or lost power, and the outfit is claimed not to slip, wedge or bind The leverage is double compounded, and the power is delivered all behind the pipe, so that it is claimed that one can exert enough to push four tons. Triple backstop pawls take up the backlash and spring of the pipe. The driving pawls are instantly reversible for pushing and pulling. The pipe is firmly gripped in vise jaws, and the machine rolls forward over the cog tracks, pushing the pipe along. The jaws are then released, and the machine rolled back for a new grip. The machine is made of malleable iron and steel and has hardened and tempered steel vise jaws.

A vital part of the pusher is the special turned steel pilot for guiding the pipe in the right direction. It is made so that there is over fifteen times the resistance to its being pushed to one side as the point of it is likely to encounter. Small stones or roots will not deflect it. In ordinary work only a short ditch is required in which to start the machine, and in work from a basement even this is unnecessary. Where the pipe is to be pushed long distances, a small hole about 18 by 36 inches must be dug every 50 to 75 feet for aligning purposes. All machines are equipped with a special sighting device to help align the pilot. The machine will work easily under pavements, sidewalks, floors, streets and lawns.

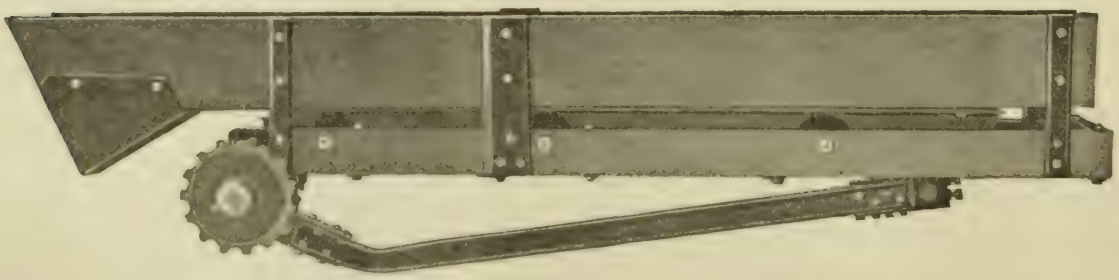
The outfit is built in two sizes. The standard machine for general use is 10 inches wide, 22 inches long and 12 inches high, and weighs 100 pounds. It can be handled in two parts, the carriage weighing about 65 pounds, and the whole can easily be handled in any ditch by one man. It can push pipe up to 1½ inch and is suited to all ordinary work. It can be used in any soil which can be dug with a spade.

EASY PIPE PUSHER INSTALLING 4-INCH CONDUIT.

The special machine for heavy work is 19 inches wide and 22 inches long. The carriage weighs 200 pounds, and the total weight is 400 pounds. It is built to handle 1 to 4-inch pipe and will work in very hard soil. It has triple gears—all gears have shrouded teeth. It has two speeds—low for heavy work and high for ordinary work. The length of track is 60 inches. This machine can be used for conduits, water and gas mains. One of the accompanying illustrations shows the large-size pusher. The other shows an



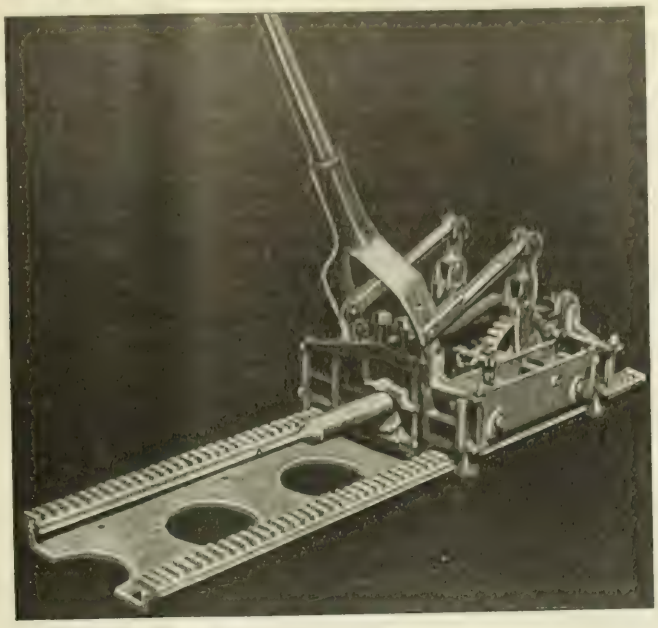
UNDER-FRAME OF FEEDER.



SIDE VIEW OF FEEDER.

FRAME OF FEEDER OF SUNBURY AUTOMATIC CAR UNLOADER.

actual job. A wire conduit, 4 inches outside diameter, was pushed under a paved street intersection without disturbing the pavement. The machine was set in a ditch just outside the pavement. A 1¼-inch pipe was pushed



SPECIAL SIZE EASY PIPE PUSHER FOR HEAVY WORK.

under the pavement to the manhole across the street, 100 feet away. Increasing couplings were put on the pipe and all pulled back, enlarging the hole to the required size of the conduit. The total time to make the push, enlarge the hole and put in the conduit, which was set with compound, was less than one day, with two men working.

The outfit is made by the Easy Manufacturing Company, David City, Neb.

AUTOMATIC CAR LOADER.

"Sunbury" Automatic Loading and Unloading Machine.

The "Sunbury" car loading and unloading machine was devised especially for handling large quantities of material from railroads in a short time. The principle used is the construction of a stationary feeder underneath the rails, parallel with and between the ties, with a movable or reciprocity bottom.

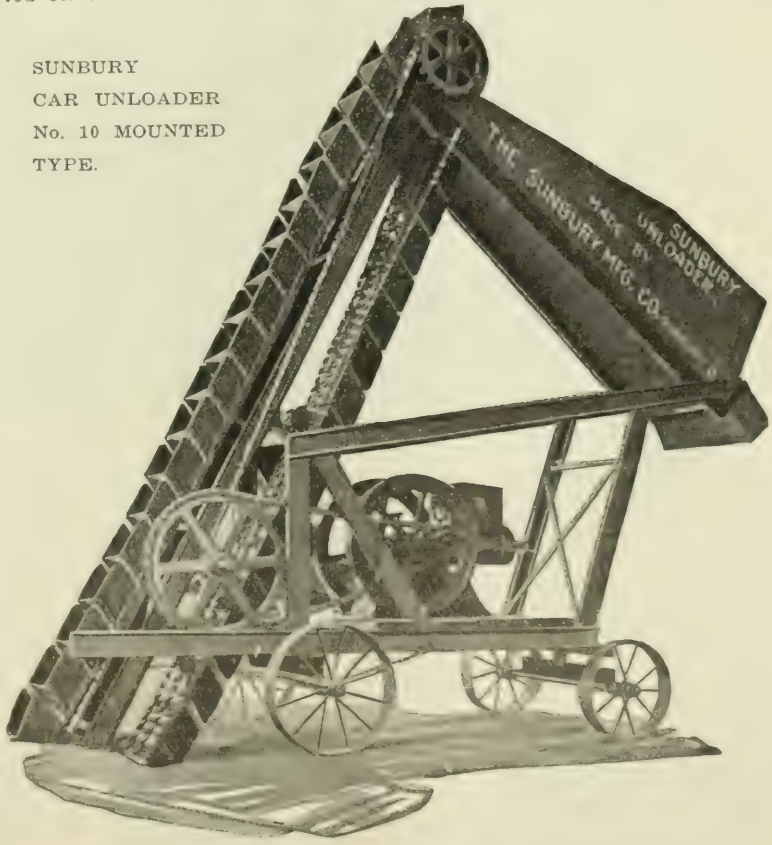
The all steel feeder is placed between the tracks and bolted fast. In operation, the bottom is moved back and forth on oiled roller bearings with a movement of eleven inches at each revolution of the crank shaft. Each outward movement carries the material toward the elevator at the rate of fifty times a minute, depositing it in the elevator on the backward stroke. The machine is automatic and requires no attention except for oiling and starting. Power is provided by an 8 h. p. hopper cooled gasoline engine, of Olds horizontal construction, equipped ready for service. A small amount of excavation is necessary to accommodate the feeder and elevator.

The regular size of feeder is 12 inches wide, 10 inches deep and 10 feet long. Feeders of different dimensions are made for handling bulky and coarse materials. The feeder is provided with wearing plates. The lower ones are securely bolted to the bottom of the reciprocating plate, while the vertical ones are adjustable, being held in place by bolts through slotted holes in sides and back of feeder. A few light taps with a hammer are sufficient to adjust the wear. The frame of the feeder is made entirely of structural steel. The three sets of rollers carry the reciprocating bottom. These rollers are mounted on hollow steel axles, which are kept full of lubricating oil. Oil is carried on the axles by a feed pipe and through them to the bearings. All bearings are babbitted.

The machine is made in a number of sizes and styles. No. 1 is capable of handling from 30 to 50 tons per hour of crushed stone, sand, gravel, coal slag or other loose materials. The elevator is made entirely of structural steel, securely braced and will not sag. It is 30 feet long, extreme height above ground being 22 feet. The frame is made from 5-inch steel channels. The buckets are made of 14 gauge steel, 16 inches wide, 8 inches deep and 10¼ inches flight, riveted to heavy double detachable link chains.

The No. 5 machine is for smaller jobs. It is built to load a wagon in from two to four minutes. It has the same size feeder and engine as the No. 1 outfit, while the elevator is 20 feet long, with chute for unloading. The No. 8 machine has a 25-foot elevator. In loading, the unloader is reversed. The feeder is placed on a level with the top of the ground and bolted to timbers on sides. These timbers form the foundation for a four-yard hopper bottom bin, 7 feet long, 4 feet wide and 4 feet deep. This bin is placed directly over the feeder which forms the bottom. Attached to the upper end of the elevator is an eight-foot chute, which carries the material to the center of the car.

The No. 10 machine is mounted. It has the same size feeder and engine as the No. 1 machine; the elevator is 20 feet long and the extreme height is 14 feet above ground. A bin of one cubic yard capacity is attached to the upper end of the elevator frame, with a clearance of eight feet above the roadway. The truck has 24-inch front and 28-inch rear wheels equipped with



SUNBURY CAR UNLOADER No. 10 MOUNTED TYPE.

6x½-inch tires. The outfit can be folded for easy transportation. It is built to load a wagon or truck in from one to three minutes.

The accompanying illustrations show two views of the feeder and a No. 10 machine. The equipment is made by the Sunbury Manufacturing Company, Sunbury, O.

INDUSTRIAL NEWS

Cast-Iron Pipe.—Prices still remain at their high level of the last few weeks. The general inactivity in orders and construction continues. Quotations: Chicago, 4-inch Class B and heavier, $68.50; 6-inch, $65.50. New York, 4-inch, class B and heavier, $68.50; 6-inch, $65.50. Birmingham, 4-inch, Class B and heavier, $63; 6-inch, $60; class A, $1 extra.

The Ransome Concrete Machinery Company of New Jersey has just been incorporated with a capital stock of $1,000,000, $500,000 cumulative preferred stock and $500,000 common stock. The new corporation takes over the business and plants of the old Ransome Concrete Machinery Company, with works at Reading, Pa., and Dunellen, N. J., and executive offices in New York city. The company has been in business 25 years. Mr. Frank L. Brown succeeded Mr. E. L. Ransome, well-known as a pioneer in the field of concrete machinery three years ago, and under his able management the business has expanded so that the new incorporation became necessary. It is planned to further extend the business until it covers a complete line of building contractors' equipment, contractors' machinery and road builders' machinery and equipment. The line includes the widely-used and favorably-known Ransome Bantam mixers, the regular Ransome standard machines, spouting and other equipment, and the Ransome-Caniff pneumatic mixers and placers. The directors of the newly incorporated company are: Frank L. Brown, New York, president; John J. Givens, Dunellen, N. J., treasurer; H. K. Brookes (vice-president, American Ex press Co.), New York; C. H. Haney (sales manager, International Harvester Corporation), Chicago; Robert H. Moody, New York, secretary; John G. Wood (general manager of works, International Harvester Co.), Chicago; G. F. Steele (manager News Print Association), New York.

The Walter A. Zelnicker Supply Co. St. Louis, Mo., has secured the services of Mr. J. C. Bryan, formerly with Manning, Maxwell & Moore, Inc., as southwestern representative of the Ashcroft Manufacturing Co., The Consolidated Safety Valve Co., The Hayden & Derby Manufacturing Co., and the Hancock Inspirator Co. Mr. Bryan will be associated with the equipment department of the Zelnicker Company.

A. W. Ransome, for many years closely identified with the development and manufacture of concrete machinery, has become connected with the **Blaw-Knox Co.,** Farmers' Bank Building, Pittsburgh. Mr. Ransome, for a long time, has been developing and putting into practice patents on improved concrete machinery, all of which have been purchased by the Blaw-Knox Co., and will be marketed and probably further developed under his direction as manager and chief engineer of the mixer department of the above named company.

The Goodyear Tire & Rubber Company, Akron, O., is announcing the appointment of managers in several of its branches as follows: Wade V. Aydelotte, formerly staff man for the motor truck tire department, has been made manager of the branch at Newark, N. J. A. W. Ellis has been transferred from Louisville, Ky., to Long Island City, N. Y., as assistant branch manager. H. F. McClure, formerly general line salesman at Louisville, succeeds Mr. Ellis as branch manager there. H. T. Roseland, formerly manager of the Phoenix, Arizona, branch, has been appointed manager of the branch at El Paso, Tex., succeeding T. J. Fitzgerald, who has been called into the federal service. D. W. Sanford, general line salesman at Phoenix, becomes acting branch manager there.

NEW YORK CITY CIVIL SERVICE.
Consultant on City Planning.
September 24, 1917.

Applications will be received by the Municipal Civil Service Commission, Municipal Building, Manhattan, New York City, until September 24, 1917, for the position of consultant on city planning No applications delivered at the office of the Commission, by mail or otherwise, after 4 p. m., Monday, September 24, 1917, will be accepted. Application blanks will be mailed upon request provided a self-addressed stamped envelope or sufficient postage is enclosed to cover the mailing.

The requirement that applicants must be residents of the State of New York is waived for this examination. Competitive examination to be open to all citizens of the United States. Persons who accept appointment must thereafter reside in the State of New York.

The requirement that every application shall bear the certicates of four reputable citizens whose residences or places of business are within the City of New York is waived for applicants for this examination whose previous occupation or employment has been wholly or in part outside the City of New York, and the said certificates will be accepted from persons resident or engaged in business elsewhere. The subjects and weights of the examination are: Experience, 7; 70% required. Oral, 3, 70% required. A qualifying physical examination will be given. Applications for this examination must be filed on a special blank, Form D, with insert.

Duties—The duties of the incumbent of this position are to investigate and report upon applications for modification of the Building Zone Resolution of the Board of Estimate and Apportionment and to develop comprehensive plans for the improvement of street traffic conditions.

Requirements—Candidates must present evidence of at least three years of experience in charge of the planning and directing of investigations of street traffic conditions, or other similar experience tending to qualify for the performance of the duties of this position.

Candidates must be at least 25 years of age on or before the closing date for the receipt of applications.

The compensation rate proposed by the Board of Estimate and Apportionment for this position is $4,140 per annum.

There is one vacancy in the office of the Committee on City Plan of the Board of Estimate and Apportionment.

MUNICIPAL INDEX

(*Continued from page* 802.)

work. 2 ills. 1,200 words. Engineering News-Record, August 30. 15 cts.

Small Circular Concrete Bins Used for Storage of Cement. Designed for hydrostatic pressure of 25 pounds per sq. ft. 3 ills. 1,200 words. Engineering News-Record, August 30. 15 cts.

Army Cantonment at Louisville Laid Out Like Suburban Development. Water obtained from Louisville system. Planting roads, sewers, water-works and camp lay-out. 4 ills. 1,500 words. Engineering News-Record, August 30. 15 cts.

Explosives for Loosening Soil. Methods and kinds of explosives. 800 words. Municipal Journal, August 2. 10 cts.

River Channel Improvement at Columbus. Work planned to prevent recurrence of damage done by floor of 1909. General plan of work. 1 ill. 1,750 words. Municipal Journal, August 16. 10 cts.

The Distribution of Pressures Through Earth Fills. Abstract of paper by A. T. Goldbeck. 2 ills. 2,250 words. Good Roads, August 18. 10 cts.

Engineering Team-Work Aids Rush Army Job at Camp Upton, N. Y. By R. K. Tomlin, Jr. 18 ills. 5,000 words. Engineering News-Record, August 23. 15 cts.

County Plant Produces Gravel at Cost of 17.4 Cents Per Cubic Yd. Experience in Logan County, Ill. 1 ill. 800 words. Engineering and Contracting, August 1. 10 cts.

Flat Site at Chillicothe Camp Demands Careful Drainage. Area of 1,900 acres has extreme range of elevation of 25 feet, but is underlain by gravel bed. Steam shovel used to dig well for water supply. By N. C. Rockwood. 6 ills. 2,000 words. Engineering News-Record, August 16. 15 cts.

Methods and Costs in Driving the Pine Mountain Tunnel. 1,500 words. Engineering and Contracting. August 15. 10 cts.

Municipal Public Markets. Wholesale, retail and farmers' market. Advantages and disadvantages of each and extent of use. Site and construction. 1,600 words. Municipal Journal, August 30. 10 cts

Bidding Prices on Public Work During the Last Three Months. 6 pages. Engineering and Contracting, August 29. 10 cts.

Column Tests and Formulas. By R. S. Foulds. 1,800 words. Engineering News-Record, August 9. 15 cts.

How Temperature Varied in Two Dams While Cement Was Setting. Thermometer readings in large structure showed an increase of 44 degrees F. 14 days after pouring. Thin arch showed slight increase, affected by the weather. By R. A. Monroe. 3 ills. 1,750 words. Engineering News-Record, August 9. 15 cts.

Fire and Load Tests of Columns Now Being Made. National Board of Fire Underwriters test building columns under combined fire and load conditions. 1 ill. 1,600 words. Engineering News-Record, August 2. 15 cts.

The Choice of Grasses to Protect Road Embankments from Erosion. By W. C. Buetow. 1,000 words. Engineering News-Record, August 2. 15 cts.

Effect of Controllable Variable on Toughness Test for Rock. 3,500 words. Engineering and Contracting, August 1. 10 cts.

Form Carpentry Sublimated. 500 words. The Contractor, August 3. 10 cts.

Methods of Handling and Measuring Bulk Cement. 1,200 words. Engineering and Contracting, August 1. 10 cts.

Apparent Specific Gravity of Non-Homogeneous Fine Aggregates. From a paper by A. S. Rea. 1,250 words. Good Roads, August 25. 10 cts.

Effect of Sand Grading on Strength of Concrete. 1,000 words. Engineering and Contracting, August 22. 10 cts

Method and Cost of Repointing Sea Wall with Cement Gun. 2,000 words. Engineering and Contracting, August 15. 10 cts

Effect of Shape of Cutting Edge on Cutting Speed and Wearing Qualities of Drill Bits. 3,500 words. Engineering and Contracting, August 15. 10 cts.

Municipal Journal

Volume XLIII NEW YORK, SEPTEMBER 20, 1917 No. 12

ROAD MAINTENANCE IN LOS ANGELES

Oiled Streets Plowed Up, Harrowed and Rolled Yearly—Sand and Gravel for Street Work Obtained from the River by a Permanent Drag and Screen Equipment—Mixing Oil and Gravel for Repairs.

By C. W. GEIGER.

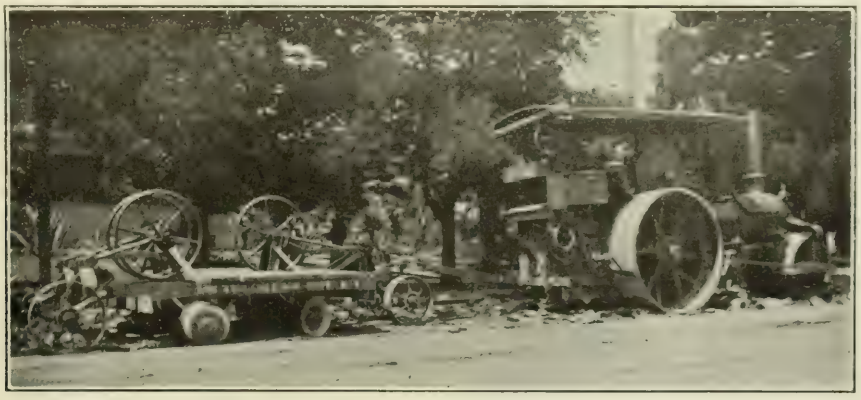
In repairing holes and cuts in the road surfaces of Los Angeles, Cal., made by sewer contractors, gas companies and others, those responsible are required to obtain from the city a mixture of oil with sand and gravel or broken stone and use this for resurfacing. The place to be repaired is left open for a depth of 4 inches below the road surface, and the oil mixture is placed in this to a depth of 6 inches, bringing it 2 inches above the surface. A roller is then run over the patch until it is packed down level with the surrounding surface. Some of the sewer contractors own rollers and do their own rolling, while others hire this done. All the contractors pay the city for the material; the sewer contractors may haul and lay it, but this is done by the city in all other cases.

About once a year the oiled streets are plowed up and a disk harrow run over them. The disk is run over each section about eight times, thoroughly pulverizing it, so as to get it into condition to be surfaced. It is then brought to even surface and rolled until solid. Oil is then sprayed on this surface by the contractor having the oiling contract with the city. Sand is then spread sufficient to absorb the oil, and it is rolled with an 18-ton roller. It is found that, with these roads, very sandy foundations do not stand up well. The street car company takes care of all streets between and for two feet outside their tracks. They dig deep for the foundation of their ties, and because of this, this portion of the street does not require so much attention as that which is under city maintenance.

In plowing up the streets, a rooter plow is used, drawn by the roller. Approximately four blocks 60 feet wide can be plowed up in a day. The disk also is drawn by the roller. Fourteen rollers are in operation continuously except during the rainy season. Each is provided with a rooter, disk, and oil tank wagon, the last for supplying fuel and cylinder oil; all of which are drawn from one job to another by the roller. The oil tank has a capacity of 1,036 gallons of fuel oil. It carries in the rear a duplex pump, operated through a flexible steam pipe by steam from the roller boiler, which pumps the oil into a 120-gallon tank on the roller. Cylinder oil is carried in cans in the rear of the oil tank. On top of the tank is a box for carrying tools, buckets, etc. Three of the rollers are operated by gasoline.

One of the most interesting features of the work is the method by which the city obtains its sand and gravel. Los Angeles river, draining the San Fernando valley, brings down enormous amounts of sand when in flood, while Arroyo Seco, flowing from the mountains, brings large quantities of gravel during floods. At the point where the latter flows into the former the city has built a plant for securing sand and gravel from the river bed, where it is deposited. When the rivers are both flooded, sand and gravel mixed in about the desired proportion are deposited within the reach of this plant; while, when they are unequally flooded, either sand or gravel may predominate and the sand is deposited over one area and gravel over another. The material is brought in from the river by scoops, either one working in the sand deposit and the other in the gravel or, when sand and gravel are properly mixed, the scoops bring in the mixed material. In drawing in the sand, considerable water is of course retained by it, and it is the practice to scoop the sand up above water level during half a day, and then, it having drained out in the meantime, to scoop it the remaining distance into the screen and bins.

A dead-man is located in the river about 600 ft. from



ROAD ROLLER (18-TON) DRAWING DISK OVER OILED STREET.

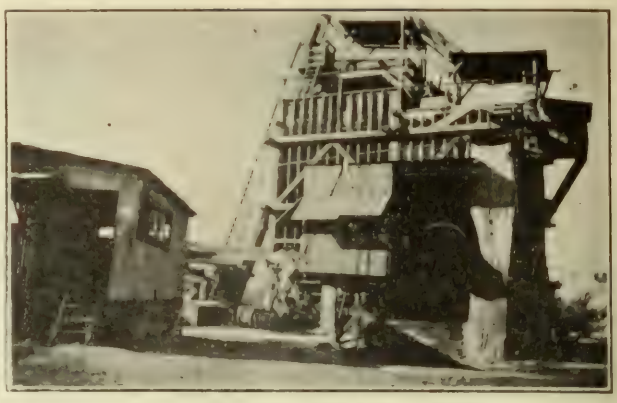
the plant, to which is fastened a bull-wheel around which passes a 1,200-ft. cable, used for dragging the scoop out into the river. Another cable attached to the scoop draws it to the shore with its load of material. These cables are operated by two drums, driven by a 75 h. p. electric motor. The scoop is operated in one place until it reaches bedrock, which it usually does at a depth of 15 to 30 ft. All of the deposit above the rock is pure sand and gravel. It usually requires about two months of dragging in one spot before bedrock is reached, and the dead-man and bull-wheel are then moved over about 40 ft. and the new area worked with the scoop.

The large gravel and the pieces of rock that are brought in are crushed to a two-inch size by a crusher operated by a 10 h. p. motor and is then screened, as is the mixture of sand and gravel. The fine sand goes into a bin of 190 cu. yds. capacity and is used for resurfacing streets. The coarser material, which consists of about 65 per cent of coarse material and 35 per cent of sand, is deposited in another bin of 175 cu. yds. capacity and is used for mixing with the oil for road repairing.

The boys in the neighborhood of this plant have persisted in swimming in the hole created by the scoop and four have been drowned. It was finally decided that the pool be turned over to the playground department, which placed a life-saver at the pool and erected a building and tent for the boys to use as dressing rooms. This has proved a very popular bathing place and no accidents have happened since the life-saver was stationed there.

The superintendent of the plant has introduced a device of his invention which is claimed to save a considerable part of the oil used in the oil-gravel mixture. In the bottom of the gravel bin is a chute leading to a hopper. When one-half cu. yd. of a mixture of 65 per cent gravel and 35 per cent sand has been run through the chute into this hopper, it is hoisted and dumped into a mixer, together with 6 gallons of oil heated to 280°. The oil is supplied through a flexible hose, on the end of which is a length of iron pipe which leads down into the mixer. The device consists of inserting into this pipe, just below its junction with the hose, a steam pipe with a ⅜-inch opening, this pipe occupying the axis of the larger pipe. When oil is turned into the mixer, live steam is blown through this steam pipe, and this serves to spray the oil into the gravel instead of permitting it to collect in parts of the batch, thus greatly aiding in its uniform distribution throughout the gravel. The superintendent states that since the introduction of this device, 12 gallons of oil mixed with a cubic yard of gravel gives better results than were formerly obtained by the use of 18 gallons.

SCOOP BRINGING LOAD OF SAND AND WATER FROM RIVER.



BINS AND OILED GRAVEL MIXER.

The oil is delivered to the plant at a temperature of 240° and stored in a 3,000-gallon tank. The oil is then raised to 280° by a 10 h. p. steam boiler. A motor and pump with an automatic cut-out forces the oil from the 3,000-gallon tank to a 100-gallon tank located above the mixer.

The plant was built in 1915 at a cost of $6,000 and calculated for a capacity of 80 cu. yds. of sand and gravel per day, but at present it is turning out 200 cu. yds. The capacity of the oil and gravel mixing plant is 160 cu. yds. per day.

A LEAK OF 330 GALLONS PER CAPITA DAILY.

Pulaski, N. Y., has a population of about 1,800. On Monday, August 20, of tis year, the water mains passed a total of 843,000 gallons, the rate between midnight and 5.30 being 780,000 gallons a day. On Wednesday, August 22, the total was 252,000 gallons and that between midnight and 5.30 was 125,000. The difference was not due to Monday being wash day, since it amounted to about 1,700 gallons, or about 100 tubs full of water, for each family.

It had, of course, been realized that the town had not been putting to legitmate use such a large amount of water, and the Pitometer company was asked to investigate. It was found that a 6-inch main was broken entirely across and the 600,000 gallons a day that escaped was entering a sewer and escaping undetected.

ERIE'S GARBAGE DECREASING.

Reference has been made upon two or three occasions in Municipal Journal to the garbage pail as an index of the economy of a city in its food consumption. Since our first editorial on the subject the idea has been taken up by others, and in a number of cities the officials are keeping close watch of the garbage collections to note whether such economy is being practised in their city.

Among these is Erie, Pennsylvania. J. Emil Gross, superintendent of parks and public property of that city, sends us a recent statement with reference to the diminishing garbage in that city. The superintendent of collections, James D. Tracy, about a week ago stated that a decrease was noticeable all over the city, but especially in the wealthiest section. He reported that during July only 596 tons of garbage were collected, while during the same

month of last year 723 tons were collected. This shows a decrease of nearly 18 per cent in amount, although the population has increased, so that the decrease would probably figure nearly 20 per cent per capita.

Although the amount to be collected has decreased, however, more difficulty is experienced in making the collections because of the trouble in retaining laborers. On Monday, August 27, five wagons out of sixteen had to be laid off because the men for driving and collecting had left to work in the factories. It is probably necessary in the present emergency that factory hands be obtained, and the desirability that the citizens diminish the amount of garbage to be collected is thus made prominent by this illustration, such reason for food economy being in addition to the one that the surplus food is needed by America and its allies.

CONVENTION OF THE NEW ENGLAND WATER WORKS ASSOCIATION

Papers, Discussions and Other Features of the Thirty-Sixth Annual Convention at Hartford Last Week—Practical Details of Trenching, Laying Mains, Constructing and Operating Purification Plants—Reports of Committees.

The 36th Annual Convention of the New England Water Works Association was held at Hartford, Conn., on September 11th to 14th, inclusive, and was attended by over 200 members and a number of guests. About 125 active members registered and 90 associate members, and each of the business sessions was well attended.

The society was particularly fortunate in the choice of its meeting place. The majority of the societies of this nature (aside from the three or four largest organizations) ordinarily select some large hotel as its headquarters and hold its meetings in a convention hall provided in the hotel. In most cases these halls are not particularly well adapted to the purpose, especially in the matter of quietness, since street noises and those from elevators and other disturbances in the hotel, and frequently from the adjoining exhibit hall, interfere more or less seriously with the reading and discussion of papers. This convention was held in a church on a quiet street, and there was absolutely no noise to interfere with the meetings, the exhibits being in the basement of the church, while the meetings were in the auditorium above.

Nineteen papers were presented at six sessions and ample time was allowed for the discussion of each. These included all of the papers on the program except three, one of these being the description of the U. S. Army Cantonment at Ayer, the author, Captain Edw. Canfield, Jr., having been called to Washington and thus being prevented from attending the convention.

In the matter of discussion, although, as stated, ample time was allowed, the advantage taken of it was rather disappointing. Had the members made full use of the opportunity, the time allotted for business sessions would have been just about sufficient; but as it was, each of the evening sessions lasted only about an hour and one-half, and the afternoon sessions about two hours. These short sessions had the compensating feature that they gave the members abundant opportunity for the inspection of the exhibits, and during the intervals the exhibit halls were well crowded with interested water works superintendents.

The business sessions occupied the entire day of Wednesday and Thursday; Tuesday afternoon was devoted to the addresses of welcome and the president's address; in the evening a reception was given by the Hartford Chamber of Commerce, and all day Friday was consumed in an inspection by automobile of the new reservoirs and watersheds of the Hartford water works, involving a trip of about 50 miles by automobile.

In opening the convention, addresses of welcome were delivered by Mayor Hagarty, C. H. Clark, editor of the "Hartford Courant"; James T. Berry, acting president of the Hartford Water Board, and others. Following these addresses the president of the association, C. M. Saville, the manager and chief engineer of the Hartford Board of Water Commissioners, gave his annual address.

PRESIDENT SAVILLE'S ANNUAL ADDRESS

After a few introductory remarks, Mr. Saville spoke as follows:

The New England Water Works Association is a "get-together" organization of men whose principal business is connected with supplying water. Included in our membership are specialists in various matters of water supply, water works operators who are doing the practical everyday work, and manufacturers of water works equipment who provide the materials we use in our work. Each of us is here to help the other and by so doing help the public whom we serve. Men from all parts of the world are on the rolls of this association and to those who know its beginnings and its traditions there is a very deep personal interest in its life and future.

The matter of supplying water is of a different character from that of any other municipal industry. All others primarily are disbursing agencies handling alloted funds. Their principal duties are to see that their funds are honestly and economically expended on pre-determined work.

The water department, on the other hand, is always a commercial enterprise, similar in many of its requirements to other public utilities, as for example the business of furnishing light and power by gas or electricity and the running of steam and electric plants. Here there is a question both of production and distribution with new problems continually arising as to methods of operation and maintenance. Economical and efficient means must be employed to produce an article that will satisfy customers and be delivered to them at fair rates. The plant must be operated in such a manner as to be at least self-supporting. Thousands of consumers must be handled individually with the same regard as obtains in the best conducted retail trade. The demands of a modern water supply system are complex and are concerned with matters little dreamed of a generation ago.

The men who are efficiently handling this work today are trained practical men, skilled in their professional work, single-eyed to economical administration, and alert to recognize, seize and apply the latest developments in water works science.

Today something more is required of the water works executive than to be able to get 480 minutes' work for the price of labor, properly to lay pipe and quickly to repair a break in a supply main. These things are necessary in carrying on the department work, but they are not the essentials of present day management. The water works executive must be familiar with all these, but in addition he must have intimate knowledge of and ability to handle such financial questions as valuation of works and equitable rate making, as well as hydraulic problems relating to supply and construction or the complexed questions involved in providing a water which satisfies modern standards.

Intelligent systems of accounting are necessary. Rules and regulations adjusted to present conditions are required. Scientific purchase of materials and supplies, cost keeping that instructs, modern transportation, checks on the care of department property, and similar matters are all part of the organization of even the mediocre construction company. How can water department business succeed without them? The question of revision of rates to meet existing conditions is most vital to successful operation, but one which is often the last to be taken up, particularly in municipally-operated plants.

Many rate schedules now in use even in our larger cities are inheritances of the past, continued because of the inertia of the present. Some of these are ridiculously in-

adequate and fail utterly to recognize conditions of plant, cost of operation, and special value to different classes of users. Such conditions result in extravagant operation and in ineffectual service.

At the present time it is the trend of opinion, based on judgment of the best sanitary specialists, that all public water supplies sooner or later must be filtered. Water is demanded which is clean and attractive from pollution, removal of turbidity and color, reduction of chemical constituents producing hardness and other detrimental conditions, and the elimination of taste and odor.

These are some of the problems of the modern water works executive. Properly met, they mean efficiency in organization and economy in operation with consequent benefit to the city. To do these things it is necessary that the manager of the water department shall be able to grasp, understand and control adverse conditions which were formerly accepted as inevitable but are now known to be amenable to remedy if not cure.

The past experience of this association with its avoidance of entangling alliances is the best guide we can have for the future. Our present position as a power in water department matters shows clearly the wisdom of the founders of this association in rightly excluding both politics and commerical exploitation from its voting membership. "As with the fathers, so may God be with us."

With other organizations we will work together gladly and we welcome all water works men to our membership. Careful consideration of our own particular needs and purposes, however, forbids any thought of combination with others. In these critical and serious times it is well for us to cultivate the attitude of the open mind and the spirit of co-operation.

One of the most cogent reasons why our manufactured products, up to the war period, had so little market in Central and South America was the arbitrary stand of American producers as to details of construction and methods of packing goods, regardless of the needs of the purchaser. Until many of our manufacturers and consumers, on the one hand, emerge from this attitude of pigheadedness, and on the other step aside from a position of cock-sureness, there will be difficulty in meeting the demands of commercial enterprise and construction possibility. Opportunity is hindered by ignorance and the effect of the small mind, unable to comprehend the standpoint of the other fellow. The talisman of success is "Co-operation." Manufacturers must concede the necessity and be willing to consider with open mind changes in plant, though expensive to them, if efficiency and economy result in construction work.

Engineers and users of manufactured products must recognize business exigencies and matters affecting established industry. They, too, must have the open mind which is free from personal bias, broad in its outlook and dispossessed of a finicky attitude. In the "get-together" atmosphere of this convention let us all try to get into touch with the real reasons for the differences between users and producers and see if we cannot reach some mutually advantageous ground in advance of that on which we now stand.

In these days the direction of the force of gravity as regards cost of labor and materials appears to have been reversed. An efficient way and perhaps the best way to meet this condition seems now to be the more general use of labor-saving tools, careful selection of materials, more thoughtful planning of work and better organization force. Present prices of labor and materials in many cases are beyond that ever before experienced, and the outlook into the future seems to reveal little or no downward tendency. For a short period there seemed to be a faltering in construction work, but contract news, construction advertisements, and bond sales indicate recovery with a tendency to accept present prices as better perhaps than will be afforded later. From this viewpoint, more and more public work of considerable magnitude is being let. With the reduction of labor due to national requirements and the possibility of greater demands for materials, even if peace should come quickly, there seems to be greater chance for increasing cost of work for some time to come.

To consider these problems, gentlemen, is the reason we are in convention at Hartford this week. While we sincerely appreciate and shall heartily partake of all the hospitality and the entertainment offered, business, more perhaps than ever before, should take precedence. For this purpose we are to listen to papers presented by sanitary engineers skilled in special lines, by practical water works operators who are doing things worth while in their own water works departments, and by makers of appurtenances used and necessary in water department work. Valuable as are these papers, more useful yet is the discussion which should arise. Special practical problems are welcomed for solution, for questions that perplex one are sure also to have troubled many others.

At the reception in the evening S. Wales Dixon, superintendent of recreation of the Park Commission, gave a short illustrated lecture on the Hartford park system, showing pictures of the gardens and crowds in the parks during the summer.

WEDNESDAY MORNING SESSION

On Wednesday morning the first paper was one by Geo. A. Johnson, entitled "Rapid Sand Filteration." This paper (an abstract of which will be given next week), was a most exhaustive treatise on the history and development of rapid sand filtration, accompanied by comparisons with slow sand filtration. It occupied 88 typewritten pages and was much abbreviated by the author in reading it, which reading occupied about one hour.

Filter Bottoms and Strainer Systems.—This was followed by a paper by Robt. Spurr Weston, discussing the matter of filter bottoms and strainer systems. Mr. Weston stated that the strainer has to perform the double service of removing water slowly after it has passed downward through the filter and also of admitting wash water at very much higher rates through the strainers upward to the filter. The strainer of the early rapid filters consisted simply of a perforated metal plate. Later strainer heads were fastened in this plate, and the orifices confined to these heads. In these early filters the sand was placed directly over the strainers, but this caused clogging of the holes, and the next step was to place six inches in depth of gravel between the strainer and the sand. In these filters the plate holding the strainers formed a false bottom under which sediment was apt to collect, and to avoid this a pipe manifold was substituted, the strainers being placed in the pipes.

Practically all of the early filters were circular in form and comparatively small of diameter, and washing them was not especially difficult, stirring rakes being quite generally used for loosening the sand. With the introduction at Little Falls of larger rectangular units, some other method of stirring up the sand became necessary and the air wash was introduced, the object of this being to break up the cakes of mud in the sand. This could be effected by wash water alone if it be given high velocity, but such high velocity was found to disturb the six-inch layer of gravel and permit the sand to settle into it. At Cincinnati, air was omitted and a velocity of wash water of 22 inches was used, the mixing of the gravel with the sand being prevented by placing a wire screen on top of the gravel. Two or three years ago it was discovered that this screen was torn from its fastenings, more or less corroded, and permitting the sand to mix with the gravel, and the screen was removed and instead the depth of gravel was increased to 14 inches, which seems to be effective in preventing the displacement of the gravel. At Harrisburg another plan was tried, that of using a pipe manifold, in the bottom of which fine holes were bored for passing the water. The next development was the Wheeler filter bottom, consisting of inverted pyramidal depressions in a concrete bottom, in which are placed a number of concrete balls. (This bottom, as used in the New Brunswick plant, was described in Municipal Journal for July 26, and the Dayton installation, at greater length, in the issue of May 27, 1915.) Recently a plant has been constructed which has returned to the earlier idea and employs a false metal bottom into which the strainers are screwed. One of these was installed at Erie, Pa., and during the discussion of this paper the superintendent of that plant stated that this filter had been in service for three years and there had been no

trouble with it of plugging or any other kind and that a very uniform wash was obtained.

Mr. Weston, who is perhaps the leading advocate of the Wheeler bottom, gave as its advantages the fact that it contains no metal to corrode, gives perfect distribution over the entire bottom of the filter and requires a depth of only six inches of gravel for small filters, increased to 8 inches for larger units. Its cost of construction was not greater, and was possibly less, than that of the Harrisburg and other types of filters, although the payment of the royalty for the patent would probably make it more expensive. Comparing the false bottom with the manifold, Mr. Weston gave it as his opinion that the former involved dangers of both construction and operation, although it is practicable in small units.

Following this there was discussion of both these papers. In connection with the matter of taste given to water by the use of alum, Mr. Johnson admitted that with the pressure filter and the old alum pot there was likely to be over-dosing with alum and a resulting taste to the water; but stated that with modern plants there was no excuse whatever for taste, which is due to unnecessarily large doses of alum.

Asked whether the pipes of a distribution system should not be cleaned of sediment before filtered water is first run into them, Mr. Johnson stated that both flushing and sterilizing of the mains prior to filtration were more or less common. Mr. Lochridge of Springfield, however, stated that in his opinion such cleaning out was not necessary, as there would be no more stirring up of the sediment by the filtered water than had been the case previously unless there were other changes in the details of distribution. He cited one case in Springfield in which the introduction of filtered water caused a reversal of direction of flow in certain mains and a considerable stirring up of sediment, as a result of which it was decided to flush out the mains. By a proper manipulation of the gates a velocity of 9 feet per second was obtained in the mains and this brought out great quantities of sediment, as much as 1 bushel of solid matter being collected at one hydrant.

A member asking whether it would be practicable to purify and use the wash water, two or three others expressed the opinion that it would be, Mr. Weston citing one case where it had been done; also stating that in Baltimore the wash water was settled in a pond and quite well clarified, although it was not used afterword. W. C. Hawley stated that the Pennsylvania Water Co. uses wash water settled for six hours and finds it better than the raw water. The water is pumped to a considerable elevation before purification and it is therefore an object to waste no more of it than is necessary, and as a matter of fact but one-tenth of one per cent of water is lost in washing.

The matter of maximum color permissible in filtered water was discussed. Mr. Johnson considered 10 parts per million as the maximum which is satisfactory and expressed his opinion that in the majority of cities the color is less than this. The color of raw water in many cases, however, was much higher, being 100 parts or more at all times in some sections, while in the northeast the maximum generally fell between 20 and 40. In his opinion any water that had a color of 30 parts or more should be decolored. Mr. Lochridge stated that Springfield consumers were satisfied with a color of 15, probably because they had never been supplied with a water lower in color. He believed that color satisfaction was largely a matter of local education, consumers being satisfied with 15 parts or even 20 parts if they had never been provided with less.

Operation of Rapid Sand Filters.—The next paper was one entitled "The Care and Operation of Rapid Sand Filters," by John W. Gaitenby, superintendent of filtration at Evanston, Ill. The filter in that city was built in 1914 by the Norwood Engineering Co. Its capacity was about 12 million gallons per day, being calculated for 100 to 125 million gallons per acre per day. Water is taken from Lake Michigan through an intake 1.6 miles long. This water sometimes contains sewage when the winds and currents are unfavorable, and varies considerably in other kinds of pollution depending upon the direction of the wind. Since January, 1916, there have been no typhoid deaths in the city. The rate of pumping varies from 3,000,000 gallons to 17,000,000 gallons per day. Venturi meter readings are taken each hour. In order to insure the use of proper amounts of chemical, the filter operator is notified by the engineer whenever the rate of pumping is to be changed. The quality of the lake water being nearly constant at all times, the amount of dose is varied with the quantity only of the water.

Once a week each bed is emptied of water and examined, and stirred up to remove mud balls or patches. This stirring is done by use of a rake made by the department, which consists of a piece of maple about 16 inches long in which are set 6 or 8 teeth, each of which extends a few inches from each face of this maple stick; bolts being employed at the two ends of the stick to prevent its splitting along the line of the holes in which the teeth are set. At right angles to these teeth, in the middle of the stick, is another hole in which is inserted an iron pipe handle, on which the rake is held by two nuts on the pipe, one above and the other below the rake. Just enough wash water is turned into the filter to make the sand semi-fluid, and the rake is then moved up and down and forward and back across the filter by men standing in the filter troughs. When these feel an obstruction, indicating the presence of a mud deposit, they work the rake vigorously here and so break up the deposit. After this raking, the filter is washed for a period three times as long as usual and is then emptied of water and the top of the sand and all exposed parts are sprinkled with chloride of lime. After a few minutes the filter is again washed to remove the chloride of lime and is then put into service. Although air is not used at Evanston, Mr. Gaitenby believes that it agitates and cleans the sand more thoroughly than does any practicable velocity of wash water.

During 1916 the average bacterial efficiency of the filters was 99.86. The amount of wash water used in 1915 was 3.68 per cent of the water filtered, and in 1916 was 2.92 per cent. The cost of operation in 1915 was $3.96 per million gallons, not including interest or depreciation, and was $3.80 in 1916, in spite of the fact that in the latter year the cost of both alum and hypochlorite had doubled.

In applying the hypochlorite, this was made in a weak solution of 0.1 per cent, it being believed that the use of such weak solution greatly reduced the probability of variations in the dose from the desired amounts.

Another item of operation in Evanston was the addition of clay to the raw water to increase the turbidity artificially from 10 to 30, since it was found that with the higher turbidity the vegetable organisms in the water could be settled out much more thoroughly. The length of run of filter between washings was increased in this way from 4 hours to 48 hours, when the water was high in such organisms.

Following this paper, the society by unanimous vote expressed its appreciation of the reception given by the Chamber of Commerce the night before. The Committee on Award of the Dexter Brackett Medal then announced, through M. N. Baker, that the medal for the past year had been awarded to C. M. Saville, for his paper presented last year entitled "Some Water Works Ex-

periences in Hartford, Conn." The other members of the committee were Desmond, Fitz Gerald and Alfred E. Martin, superintendent of Springfield, Mass., water works.

WEDNESDAY AFTERNOON SESSION

Regulating Private Water Companies in New York.—Following the election of two new members to the society (one of whom was a visitor from Petrograd, Russia), Delos F. Wilcox, deputy commissioner, Department of Water Supply, Gas and Electricity, New York City, read a paper entitled "Regulation of Private Water Companies in New York City." Several of the communities absorbed in the combination which now forms Greater New York were served by private water companies, and their franchise rights, of course, continued under the new condition. What control the city or any city or state commission has over these private companies is a matter concerning which there is some doubt, since up to date only one suit has been brought which gave the courts an opportunity to pass upon this question. Fairly successful and adequate control is maintained by the city through moral suasion and mutual agreement with the companies, this control including the matter of rates as well as securing extensions into new territory whenever this becomes desirable. Probably the most weighty argument which the city advances in securing acquiescence of the companies in its requests is the right which it possesses of duplicating the private mains and introducing municipal service in the territories now served by private companies. The city has acted upon the principle of not imperiling the value of the property of these private companies by municipal competition, although it retains the right to do so should the company refuse to render such service as the city thinks to be requisite.

The matter of rates is a difficult one to solve with justice to all concerned, especially in view of the fact that the private companies obtain their water from wells and must pump it to standpipes, while the city's supply is all obtained by gravity. The general method followed is to adjust the rates so that an adequate income may be derived upon a value of property based upon reproduction value of plants less depreciation, with due consideration of the fact that in many cases the mains are rapidly becoming too small for adequate service and so are subject to high obsolesence, which also is true of the pumping plants and wells. As there are no reservoirs and the obsolesence on the mains is high, the general depreciation rate used is higher than that adopted in most cases. No allowance is made for any franchise value—as a matter of fact such value exists only at the pleasure of the city.

In order to give a greater certainty of fire protection to the districts served by the private companies, the city has connected the municipal distribution system with the private supply in case of need, placing a sealed valve in each connecting link. In some cases these have been used to supplement the private supply under other conditions. On the other hand, the city purchases water from the private companies for municipal purposes such as use in municipal buildings, street cleaning, sewer flushing, etc.

The next paper was one entitled "Water Rate Revision in Waltham, Mass.," presented by Bertram Brewer, the city engineer and superintendent of sewers and water works of that city. This paper is published in full elsewhere in this issue.

Experiences with Trench Machines.—The next paper was one not contained in the program, entitled "Experiences with Trench Machines," by Geo. W. Batchelder, water commissioner of Worcester, Mass. Worcester in 1914 purchased an Austin trench machine for digging trenches for city mains. The machine was used that year for digging a trench 6 feet deep for a 36-inch pipe. As the trench was about two feet wider than the width dug by the machine, the side banks were broken down with bars used from the surface, the dirt so thrown into the trench being removed by the excavation buckets. This machine handled with great ease the gravel which constituted the soil in this trench, and also the sand excavated in a succeeding job. In fact, the rate at which the excavation was performed was so much faster than that at which the pipe could be laid that the machine was used only a few hours a day. Later the machine was used for trenching for a 42-inch pipe, in which case also it was necessary to break down the sides of the trench to secure the necessary width. Later the machine was used for excavating a considerably deeper sewer trench in hard clay. Mr. Batchelder said that this machine can be used where there are house connections, although the necessity to avoid injury to these in excavating interferes with the ease of operation.

At present the chief difficulty with the machine is to find sufficient work for it. In the average soil of Worcester it will dig a trench 5 feet wide and 6 feet deep at the rate of 1½ feet a minute. Operation requires 90 to 100 pounds of coal per hour and an operator and fireman on the platform and one man in the trench to direct operations, with others to widen the trench by breaking down the banks when this is necessary. At the present time this machine has been rented to the city of Hartford for laying a 12-inch cast iron pipe.

Worcester is also using a back-filling machine consisting of a boom and scoop bucket; the bucket is drawn out by two men to the further side of the bank of excavated material and is then drawn to the trench by the cable and boom. Three men handle the back filler and easily perform all the back filling for even the largest trench.

Northampton's Water Works Shop.—H. W. Hosford, city commissioner of Northampton, Mass., then described the new water works shop which is being built by that city. The shop consists of a two-story and basement building in which are located offices, repair shops, stock rooms, etc., and also a one-story annex containing garage and store house for cast iron pipe and other large stock. This building is estimated to cost $29,000 complete, including the machinery and all appliances.

WEDNESDAY EVENING SESSION

The evening session was shorter than had been anticipated because of the inability of Capt. Edw. Canfield, Jr., U. S. A. Constructing Quartermaster, to be present to describe the organization for building the United States army cantonment at Ayer, Mass., Capt. Canfield having been called unexpectedly to Washington.

Operating Details at Windsor, Conn.—A paper describing "Some Operating Problems of a Small City Department" was read by Homer R. Turner, superintendent and engineer of the Windsor Fire District. The town of Windsor having refused in 1910 to purchase the plant of the Windsor Water Co., in 1915 the thickly populated part of the town incorporated as the Windsor Fire District and purchased the plant of this company. It proceeded to extend the distribution system, install fire hydrants throughout the district, to enlarge and improve the pumping equipment and to erect a steel standpipe. The paper deals with a few problems which arose in operating the plant and the method of meeting them.

The water is impounded in a reservoir with a capacity of 15½ million gallons which drains an area of about two square miles devoted largely to tobacco raising. In January, 1917, for the first time positive tests for B-Coli were obtained and in June the commissioners authorized the installation of a liquid chlorine disinfection plant, which was installed by Mr. Turner under the direction of James A. Newlands, chemist for the water department, and the

water is now being treated with chlorine at the rate of 0.6 part per million. Tests show a reduction in all bacteria of 85 per cent, with entire elimination of B-Coli.

During July of this year disagreeable odors were noticed in the water and an investigation showed that large masses of spirogyra had become caught on fixed growths in the shallower portion of the reservoir bottom, which, on decomposing, had produced the odors. The condition became rapidly worse and within twenty-four hours the odor had permeated the entire reservoir. The writer decided immediately to drain the water from the reservoir and pump the supply from the brook above the reservoir. In this way it was possible to leave the bed of the reservoir exposed to air and sunlight, thus permitting the decomposing matter to oxidize more completely and obtaining water which was comparatively fresh and free from odor. The benefit of sedimentation of the pollution was lost, but the chlorine treatment eliminated all danger. After the reservoir had been treated for ten days, the offensive matter was sufficiently oxidized to permit the filling of it again.

The private company's pumping equipment had consisted of two Rife rams and an 8 x 12 Gould's triplex pump direct connected to a 10 h.p. gasoline engine. As the storage capacity of the reservoir was less than one day's consumption, additional pumping equipment was essential for fire protection. A 10 x 12 inch Smith-Vaile triplex pump was substituted for the ram, operated by chain drive by a 100 h.p. Westinghouse slip ring motor. As this unit was to be used but three or four hours a day, automatic operation was provided in case of emergency or extreme low pressure. For this purpose there was installed a Westinghouse alternating-current magnetic switch starter controlled by a pressure gauge switch. This switch is satisfactory for starting the switch on low pressure, but experience has shown that it will not operate within close limits for stopping the pump when the standpipe is filled. A positive action float switch which can be installed in the top of the standpipe will prove the only satisfactory method of automatically controlling the apparatus.

At first the chain drive gave trouble because the lubricating oil which was dropped upon the top of the chain was thrown off by the high speed without penetrating the link joints. This difficulty was overcome by applying the oil to the inside of the bottom chain through a perforated ½-inch pipe, the centrifugal force working the oil out through the links.

When drawing up proposals for the water mains, alternative prices were asked for using lead and leadite in making the joints. The contractor to whom the work was awarded offered to use leadite for ten cents a foot cheaper than lead joints, and after favorable replies has been received from several users of leadite it was decided to use that material and it was employed upon 28,000 feet of 10-inch main. Certain precautions were found necessary in using it, such as the necessity of keeping the temperature just right, of insuring the absence of oil or grease from the jute used or the bell of the pipe, and the necessity of building the pouring gate at least 3 inches higher above the bell than would be necessary for lead; the last being because the material is too light to flow back into the joint at the top of the bell without a slight head. The leadite in the gate can be broken from the joint when cold and remelted. It was found that better results were obtained if the pouring was kept at least four lengths of pipe back of the laying gang, since the shock of driving home a new length of pipe tended to break a freshly made joint. "One serious disadvantage in the use of the material is its tendency to crack, being brittle on new work. One 6-inch pipe crossing under a railroad track which was laid in 1914 has broken down at the joints and it has been necessary to cut out the leadite and use lead in this location. Another disadvantage in repairing a defective leadite joint is the necessity of shutting the water off the main. It has been found impossible to caulk or patch a leadite joint with lead wool or other material. Best results are obtained by entirely removing the leadite from the joint and repouring the joint with either leadite or lead. On the other hand, the ease with which plugs can be cut out or joints cut away in order to remove several lengths of pipe has proven a distinct advantage."

The standpipe was not complete when the pipes were laid and therefore the joints were not tested at that time. Final tests by the writer were made this year by shutting off all service connections at the curb and all gates on connecting lines. No doubt some water leaks through these curb connections and gates, but even after allowing for this the test showed up well. The standpipe was pumped full of water, which gave pressures of from 45 to 70 pounds on 35 per cent of the mains and 70 to 98 pounds on 65 per cent. Water was fed from the standpipe to the system by a by-pass around a closed gate, on which by-pass was a one-inch meter. Gauge readings of the pressures on the line were taken at two points during a test, which lasted 4 hours. During this time water passed through the meter at the rate of 1,861 gallons per 24 hours or 0.360 gallons per 24 hours per lineal foot of joint.

A paper was then read by William Haine, of the Newlands Sanitary Laboratory, entitled "The Control of Microscopic Organisms in Water Supply." (An abstract of this paper will be given in a later issue.) In discussing the paper, superintendent Gear of Holyoke, stated that he had used chloride of lime for killing algae in a reservoir with good results. In discussing the effect of swamps and lagoons connected with or draining into a reservoir in developing algae therein, Mr. Haine suggested the spraying of such swamps and lagoons with copper sulphate by means of a spray pump, it being impracticable to apply the copper by the ordinary method of dragging it through the water in a burlap bag.

Universal Pipes in East Hartford.—The final paper of the evening was one scheduled for Thursday afternoon entitled "Experiences with Universal Joint Pipe," by John H. Walsh, superintendent of water works, East Hartford. The first pipe of this kind laid in East Hartford was in 1908, when 1,800 feet of 4-inch pipe was laid, since which time approximately 45,000 feet of 4, 6 and 8-inch pipe of this kind has been put into service. The line first laid has been in use for nine years and the records show that there has been no expense whatever for repairs that were caused by any deficiencies in the pipe itself. In January, 1909, the new line froze near the end, and as thawing it out would be very expensive and the four consumers affected had wells that they could use, nothing was done until the latter part of February, when a warm spell came and thawed the pipe, and then trouble began. One Sunday morning Mr. Walsh was called to this point by report of a bad leak and drove to it, five miles away, carrying two lengths of 4-inch Universal pipe. He found that one length of pipe was cracked in the middle for a length of 18 inches. Water was shut off from the line and three lengths of pipe, or 18 feet, were uncovered and in one hour water was turned on again. Bolts were taken out of the joint at the ends of the burst pipe and loosened in the next joint each way, and the broken pipe was raised until the ends came apart. The new pipe was then set in place and lowered to proper position and the bolts tightened. This illustrates the ease with which repairs to this kind of pipe can be made.

Any ordinarily intelligent laborer can learn to lay this pipe in a few hours. To lay 4-inch pipe, four men are used, two to get the pipe ready and two in the trench to

lay it and bolt it. On 6 and 8-inch pipe six men are used. On several 4-inch lines Mr. Walsh has laid 600 feet in eight hours with four men. Since 1908 several improvements have been made in this pipe, such as bracing the lugs and strengtening the bell end of the pipe. It comes in various lengths from 1 foot up to 6 feet and all kinds of bends, tees, crosses and drop offsets that are used in laying water mains can be obtained. Mr. Walsh believes that his department was the first one to call for drop offsets.

A line of 4-inch bell and spigot pipe that passed under a web of trolley switches and tracks gave considerable trouble from burn-outs caused by electrolysis. One hundred feet of this was removed and Universal pipe substituted and in the five years since then no repairs of any kind have been required at this point.

In rounding short curves Mr. Walsh uses a short length, say 2 feet, then a 6-foot length and as many 3-foot lengths as are needed to make the turn. Before testing the pipe at curves, it is braced against the side of the ditch with flat stones placed about 6 feet apart, which are left in permanently. In laying pipe, it is tested before covering, water first being turned in under the regular pressure and the gate then being closed and a pump used to raise the pressure to 100 or 200 pounds and keep it there until every joint is thoroughly inspected, when the pressure is gradually lowered.

The soil of East Hartford is mostly sand and considerable tunneling is done in laying pipe along macadam roads. The practice is to dig 8 feet and leave 4 feet, and by using a 6-foot measuring pole it is possible to bring all the joints in the open ditch. In crossing under improved concrete or any kind of tarred road up to 25 feet in width, the pipe is always laid in tunnel. Sufficient trench is opened up each side of the crossing to take in the length of pipe required to cross the road, and the pipes in this length are then bolted up tightly together, both ends plugged, the pipe filled with water and tested under the pressure. The water is then drained out, a rope is passed under the street through the tunnel, a block and fall is used and the pipe pulled through and bolted to the end of that already laid.

In laying the pipe, Mr. Walsh uses clean grease on the joints, commenting on which Mr. McKenzie stated that he uses pipe paint on the joint, having laid about 25,000 feet in this way.

Following this, the convention adjourned until Thursday morning.

THURSDAY MORNING SESSION.

The entire Thursday morning session was devoted to papers describing Hartford's waterworks system, which were read by six members of the engineering staff—W. E. Johnson, division engineer; Frank Brainard, assistant engineer; H. W. Horne, division engineer; R. E. Wise, designing engineer; H. W. Griswold, assistant engineer, and J. E. Garrett, office engineer. These engineers gave in their several papers a history of the works, a description of the distribution system and descriptions of the engineering and contracting features of the works connected with the new supply which are now nearing completion. A synopsis of these papers will be presented next week.

THURSDAY AFTERNOON SESSION.

This session began with a paper by J. L. Jackson, member of the Advisory Council of the State Department of Health, entitled "The Pollution of Streams in Connecticut." Mr. Jackson, in connection with his paper, showed a number of lantern slides illustrating pollutions along the rivers in Connecticut, most of them individual or by manufacturing plants, but producing in the aggregate a large and alarming amount of pollution.

F. L. Cady, bacteriologist of the Providence, R. I., Water Department, then read a paper (postponed from Wednesday morning) entitled "Methods of Operation and Results Obtained with Slow Sand Filters." The Providence filters have been constructed and in operation for some years, but Mr. Cady brought out a number of interesting details in their operation. Among these was the use of liquefying pipes in the sand ejectors used from the beds to the sand washers. Another was the use of wooden nozzles in these ejectors. The iron pipes in the ejectors were found to wear off rapidly at the outlets, and 1 inch wooden plugs were driven into the holes, a hole being drilled through the center of each plug so that it acted as a nozzle. The life of these was found to be considerably greater than the original construction.

Following this was a paper by S. E. Killam, superintendent of pipe lines and reservoirs of the Metropolitan Water Works, Boston, giving "The Results of the Use of Meters in the Metropolitan Water District, Boston." An abstract of this paper will be given in a following issue. In discussing it, one of the members asked what was considered the least amount to which the night consumption could be reduced, in reply to which the opinion was expressed that it was not practicable on the average to get this below 50 per cent of the 24-hour consumption; part of this being legitimate use, but probably the greater part being composed of an infinite number of minute leaks in service connections, joints and elsewhere which were too small to make it practicable or economical to locate and stop them individually.

Although it was now but four o'clock all of the papers on the program had been read and the meeting adjourned until the evening session.

THURSDAY EVENING SESSION.

This session had been set aside for the reports of committees and a general discussion on the use of different materials for water mains or any other subjects suggested by the members. The report of the Committee on Water Consumption was read by the chairman, Edward S. Cole, and was accepted and adopted. This committee had acted jointly with a similar committee appointed by the American Water Works Association in adopting a standard form for water consumption statistics. The report was the same as that previously presented to the American Association and published in MUNICIPAL JOURNAL of May 24th.

Mr. Richards then read a brief discussion of present conditions relative to labor and materials in municipal work. He estimated that labor had advanced 40 per cent and the value of the service rendered had decreased 50 per cent. Also that tools and materials had doubled in cost. He also believed that all available money, skill and energy should be used for war purposes and therefore moved that it be given as the sense of the convention that cities postpone all work not necessary now, which motion was carried.

Following this the society by a standing vote expressed its thanks to the officials and citizens of Hartford for the entertainment of the members during the convention.

The Committee on Revenue Derived from Fire Service submitted a report which was received and the committee continued. It cited the decision in the Portland Water District case which it considered a very important one, especially that part of the decision in which the court held that every consumer should pay for what he receives, since what he does not pay for, others must. If this idea should be embodied in water rates in all cities it would mean a radical revolution in many of them. Important also was the decision that any one operating a factory or conducting any business in which there is a special fire risk owes it as his duty to the community to take special fire precautions, and the cost of

such precautions should be borne by himself and not by the community; and that failure to provide such precautions is as indefensible as a public nuisance of any kind. The only logical conclusion from this court opinion is that cities should charge for all private fire services.

The meeting was then opened to discussion of pipe materials and the courtesies of the floor were extended to non-members during this discussion. At the invitation of the president, a representative of the Lock Joint Pipe Company, Geo. C. Bartram, gave a brief statement of the use of that kind of pipe for water mains under heads up to 100 feet. The first installation was in Baltimore, where the pipe was used up to a 75 feet head. At Winnipeg six miles are now under construction where the pressure runs up to 45 pounds. The speaker believed that 100 to 125 feet was the maximum head under which the pipe would be economical, since a greater pressure than this would require so much steel reinforcement that an all-steel pipe would be cheaper. At present prices of steel and cast iron, however, and under moderate heads, this pipe costs only about half as much as steel or iron. It is not practicable for distributing systems, since it cannot be tapped for service connections. Concerning the manufacture, the speaker stated that the cement was mixed 1:1½:3 and no waterproofing material of any kind was used, their experiments having indicated that a rich concrete was cheaper that a 1:2½:5 concrete containing sufficient waterproofing to make it tight, besides being stronger. The concrete was mixed fairly wet in order that it might flow around and adhere to the reinforcement, although not fluid by any means. The laitance which floated to the surface was allowed to overflow the side of the form and so was removed from the pipe. A richer mix was used for a few inches at the bottom and top of the pipe.

Another speaker described the use of welded steel pipe with bell and spigot joints. This pipe he claimed had been shown by test to carry 20 per cent more water than cast iron pipe of the same diameter. Some lines had been in service for thirty years and showed little tuberculation. The coating of the pipe was an important feature but was now well understood. The speaker recommended covering the first outside coat with a fabric and this again with asphalt. Little trouble had been experienced with the inside of the pipe if it had been properly dipped. He cited a pipe laid thirty-one years in Butte, in which there had been but six failures and another laid in Colorado Springs twenty-five years ago in which there had been no failure.

The advantages of cast iron pipe for house connections were presented by H. Y. Carson, who stated that, as compared with thirty-years for welded steel pipe, cast iron could show a life of more than 200 years. There was practically no danger of cast iron pipe failing by rusting. As to cost, he stated that 2-inch cast iron pipe would cost no more than 2-inch lead pipe laid as a house service, and would be less liable to be stopped with sediment and more easily cleaned in case of stoppage.

No further discussions of the pipe question were offered, nor were any other subjects suggested for discussion and the convention thereupon adjourned.

The only remaining feature of the convention was the inspection of the new construction work being carried on by the Hartford Water Commission, which inspection was made in automobiles and occupied practically all of Friday.

EXHIBITS AT THE CONVENTION.

Exhibits were displayed in the basement of the church in which the convention was held and a few in the yard outside. The exhibit hall was rather crowded with exhibits, but especially with interested and inquisitive superintendents busily examining them. The exhibitors were as follows:

American Bitumastic Enamel Co., New York.—Pipe coating. American City, New York.—Copies of publication. Builders' Iron Foundry, Providence, R. I.—Venturi meters; Globe castings. Central Brass Co., Cleveland, O.—Brass goods. Central Foundry Co., New York City.—Universal cast iron pipe. Chapman Valve Co., Indian Orchard, Mass.—Brass goods. Chicago Pneumatic Tool Co., Chicago, Ill.—Air hammers. Joseph Dixon Crucible Co.—Paints, lubricants and pencils. East Iron and Machine Co.—Waterworks equipment. Eddy Valve Co.—Valves and hydrants. Electro Bleaching Gas Co., New York.—Water sterilizing apparatus. Engineering News-Record, New York.—Copies of publication. Fire and Water Engineering, New York.—Copies of publication. Hersey Mfg. Co., South Boston, Mass.—Water meters. Kennedy Valve Co., Elmira, N. Y.—Valves. Leadite Co., Philadelphia, Pa.—Pipe joint compound. Lead Lined Iron Pipe Lead lined wrought iron pipe. Lock Joint Pipe Co. Alexander Milburne Co.—Portable carbide lighting equipment; 10,000 candle power light. Mueller Mfg. Co., Decatur, Ill.—Brass goods. Municipal Journal, New York.—Copies of publication. National Meter Co.—Water meters. National Water Main Cleaning Co., New York.—Cleaning equipment and incrusted mains. Neptune Meter Co., New York.—Water meters. Norwood Engrg. Co., Florence, Mass. Pitometer Co., New York.—Pitometers. Pittsburgh Meter Co., Pittsburgh, Pa.—Water meters. Pratt & Cady Co., Inc., Hartford, Conn.—Valves. S. E. T. Valve Co., New York.—Valve boxes. Chris D. Schramm & Son, Philadelphia, Pa.—Air compressors, etc. A. P. Smith Mfg. Co.—Tapping machine. Thompson Meter Co., Philadelphia, Pa.—Water meters. Union Meter Co.—Water meters. United Brass Co., Cleveland, O.—Brass goods. U. S. Cast Iron Pipe Co., Burlington, N. J. Wallace & Tiernan Co.—Chlorinating plant. Warren Foundry & Machine Co.—Cast iron pipe. Waterworks Equipment Co., New York. R. D. Wood Co., Philadelphia, Pa.—Hydrants and valves. Worthington Pump and Mach. Corp., New York.—Water meters and pump.

RATE REVISION IN MUNICIPAL WORKS.*

By BERTRAM BREWER.†

In every community the question of water rates is always a predominant one. Sometimes it reaches a critical stage, as it did in Waltham a few years ago.

It goes without saying, therefore, that every Water Board or Superintendent of Water Works should be thoroughly well informed as to all the fundamental facts of his system having a bearing on the rates. It is often wise to publish a report of the facts concerning this question for the benefit of consumers, and it is always wise to keep ahead of public discussion of rates and keep the public well informed from time to time of conditions and facts which bear on the subject, so as to guide it if possible toward a sound judgment. A study of the rate question and a printed report of the same was published by the writer in 1915 for the Waltham Water Department, and this description of the way in which it was done is offered as a good method of treating the problem in municipally owned works and with the hope that it may be of use to someone.

RATE FIXING IN WALTHAM, MASS.

It was decided at the outset that the period to be forecasted should take in the succeeding five years. The Waltham case was much simplified by the fact that the works are not only municipally owned, but that the City has, fortunately, in the main lived up to the principle that its water works are held by it in trust for the people, and has therefore given the water takers the benefit of any surplus of receipts over expenditures by reducing the cost of water from time to time to those who pay for and use it.

The use of city water for public purposes had for several years been cared for by a charge for all public use of

*Paper before the New England Water Works Association.
†City Engineer and Supt. Water Works & Sewers, Waltham, Mass.

water, except drinking fountains and watering troughs, together with a levy of the nominal sum of $5.00 annually for each public hydrant. Supplies for private hydrants and for fire protection purposes have always been furnished free, the owner paying the entire cost of installation. The question of the fairness of this deal from a financial point of view was not considered in the 1915 investigation. It had proved satisfactory to all parties for several years and the fact that the Department has never paid taxes to the city pretty nearly evened up the obligation. With this phase of the question eliminated and granted that the consumers ought to receive the full benefit of their co-operative venture, the investigation, which covered the five years succeeding 1915, and as many preceding years as was necessary to help in forecasting the future, was begun along the following lines:

1st.—A complete estimate of the reproduction cost of the entire system was made.

2d.—Figures were prepared to show in detail all expenditures for the preceding five years, classified and tabulated so as to show their relation to future expenditures. A chart was prepared showing the growth of population in Waltham. Other charts were made showing the quantity and quality of the water from year to year for a long period. The Waltham supply is a ground water taken from two large wells near the Charles river.

3d.—The effect of metering on revenue and consumption was also especially studied for the preceding five-year period, as this was a very uncertain element in any estimate of future revenue. Up to 1915 less than 40% of the services were metered.*

With all these facts fully investigated and at hand, certain assumptions for the future were made. For one thing it was assumed that metering would be rapidly continued so as to be entirely completed at the end of the five-year period under consideration; and again, that such metering would result in some reduction in the per capita consumption. In 1913 the consumption was 91 gallons per person, with 25% metered, while in 1916 it was 76, with 41% metered. We believed that this figure should certainly be cut to 65 by the end of the next five years.

The next step consisted in forecasting probable future expenditures, both ordinary and extraordinary. In Waltham these consisted of the following:

1. Installation of and repairs to services.
2. Operating expenses, pumping, care of real estate, reservoirs, mains, gates, hydrants, etc.
3. Fixed charges.
4. Extension of metered services.
5. Replacement of mains.
6. Higher service for the higher part of the city.
7. Additions to the collecting works to provide for a larger supply.
8. Extension of mains.

In order to ascertain how much profit or loss the next five years would bring, a careful estimate of income on the basis of existing rates was made. Investigation of past experience seemed to indicate that the income from metered services averaged 90% of what it had been under fixture rates, and this percentage was used as a basis for estimating that portion of the income as the fixture-rate services should be changed over to metered. The remainder of the estimate was comparatively simple.

The estimate of income consisted of the following items:

1. Income from fixture rate services.
2. Income from existing metered services.
3. Income from existing fixture rate services changed over to metered.
4. Income from new services.
5. Income from a new high level supply.
6. Income from installation of services, repairs, etc.

Perhaps it would make it clearer to insert at this point the table just as it appeared in the Waltham report, illustrating the results of this particular study as it was expressed in figures for the Waltham city government.

CITY OF WALTHAM, MASS., SPECIAL REPORT ON WATER RATES.

Estimate of Total Operating Expenses, Including Fixed Charges for Years 1916 to 1920.

	1916.	1917.	1918.	1919.	1920.
Ordinary operating expense	$38,000	$38,500	$39,500	$41,500	$42,000
Meter installations	6,000	6,000	6,000	6,000	6,000
Renewals to improve circulation	2,000	2,000	2,000	2,000	2,000
Extension for high service (fixed charges on $50,000, 30-year loan)	....	....	....	5,000	4,880
Additional supply (fixed charges on $21,000, 5-year loan)	5,840	4,640	4,480	4,320	4,160
Installation of services and repairs	5,560	5,651	5,742	5,833	5,924
Fixed charges on existing debt	24,505	23,795	21,795	13,407	10,362
Fixed charges on an expenditure of $5,000 annually for extending street mains	....	2,320	4,560	6,720	7,800
	$81,905	$82,906	$84,077	$84,780	$83,126
Contingencies, 5 per cent	4,095	4,145	4,204	4,239	4,156
	$86,000	$87,051	$88,281	$89,019	$87,282

Estimate of Income for Years 1916 to 1920.

	1916.	1917.	1918.	1919.	1920.
Fixture rate service	$38,220	$28,666	$19,111	$9,555	....
Present metered service	42,410	42,410	42,410	42,410	$42,410
Present fixture rate services changed to metered, including rental	8,585	17,170	25,755	34,340	42,925
New services (metered, including rental)	1,909	3,818	5,726	7,635	9,544
High level supply, new services	....	....	....	400	450
Installation of services, repairs, etc.	2,873	2,919	2,966	3,012	3,058
	$93,997	$94,983	$95,968	$97,352	$98,387

Excess of Estimated Income Over Expenses.

1916.	1917.	1918.	1919.	1920.
$7,997	$7,932	$7,687	$8,333	$11,105

It will be observed that the estimate showed a surplus of income over expense. Definite recommendations were accordingly made looking to a small reduction in income. The reductions were intended to apply to certain charges which the water takers found most annoying, as, for instance, an annual charge of 10% of the cost for the meter and its installation in every case. It was also recommended that the city assume the duty of installing supplementary meters in multi-tenement houses, if the owner would arrange the piping so that all meters could be set near together in one cellar.

The report was not published until 1916 and its recommendations were not carried out until the year was half gone, so their effect was not very apparent up to the end of the financial year 1916. Work on the extension of the supply has not yet been begun. It proved to be a bigger problem than was anticipated and may cost a large amount of money. All this, together with a large saving in operating expenses due to a new and business-like administration of affairs, rather upset the estimates and the department had a larger surplus than was anticipated on January 31 of this year. Just as soon as a definite policy in regard to a more adequate supply can be adopted, it is intended to apply the elements of the 1915 study to the new conditions and adjust prices accordingly.

SUMMARY AND CONCLUSIONS

An enormous amount of literature has been published relative to rate fixing, much of it very complicated and full of perplexities to the average mind, even among men familiar with water works administration. The problem in a municipally owned plant is fortunately comparatively simple—mainly to make the returns commensurate with the expenditures.

(To be continued.)

*For a discussion of the information obtained by this study, see an article by Mr. Brewer in Municipal Journal for May 3, 1917.

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TECHNICAL STUDENTS AND THE WAR.

Enlisted men (or boys) under 21 years of age who interrupted their courses in technical schools to enlist in the army or navy are being given leave of absence by the government to return and finish their studies, it being believed that by doing this they will serve their country better than by going to the front. It follows that those technical students who have not enlisted can most patriotically perform their duty to their country by remaining at home and completing their course. It is not so picturesque or exciting, but it is placing their ability and past training where it will do the most good.

Ideas of men whose opinions will be admitted by all to be more worthy of consideration than those of any others in the nation are quoted below:

There will be need for a larger number of persons expert in the various fields of applied science than ever before. Such persons will be needed both during the war and after its close. . . . I would particularly urge upon the young people who are leaving our high schools that as many of them as can do so avail themselves this year of the opportunities offered by the colleges and technical schools, to the end that the country may not lack an adequate supply of trained men and women.—President Wilson.

Let the young men of America devote themselves to the various branches of engineering education, so that when this war is over the call will not be in vain to young men who have had the training and have learned the lessons necessary to enable them quickly and rapidly to play a part in that great reconstruction enterprise.—Secretary of War Baker.

This cataclysm of war must not be allowed to disorganize our structure for all time, and one of the things we will need after the war, just as we have needed it before the war, just as we are needing it today, will be trained young men to take the place of the older who go out.—General Wm. N. Black, Chief of Engineers, U. S. Army.

Boys should remember that they are now serving in the best possible way by preparing themselves to serve more efficiently when the time comes . . . It is a great mistake for partly educated young boys to rush to the colors now. We don't need them. It is very important they should finish their education.—Major-General Leonard Wood.

It is especially desirable that those who have completed all but one or two years of an engineering or other technical course return this fall and finish such course. By so doing they will increase many fold the ultimate service that they can render their country.

UNION OF N. E. W. W. A. AND A. W. W. A. NOT PROBABLE.

For several years past there has been discussed by members of the American and the New England Water Works Association the union of these two societies into one strong national organization, and co-operation along several lines by means of joint committees has fortunately been brought about. Prior to the recent convention of the New England Association, the president sent to members of the American Association a cordial invitation to attend the convention of the sister society. It might have suggested itself that this was a move toward a more formal getting together of the societies, but any such idea was completely dispelled by the president's annual address, in which he said:

With other organizations we will work together gladly and we welcome all water works men to our membership. Careful consideration of our own particular needs and purposes, however, forbids any thought of combination with others.

If the president has expressed the views of the majority of the members of the society (and we believe that such is the case), the door is definitely closed, for the present at least, to consolidation of the two societies. To those who are acquainted with the feelings of the older members, this decision is explained, partially at least, by another paragraph of the president's address:

The past experience of this association, with its avoidance of entangling alliances, is the best guide we can have for the future. Our present position as a power in water department matters shows clearly the wisdom of the founders of this association in rigidly excluding both politics and commercial exploitation from its voting membership.

COST-PLUS-A-FIXED-SUM CONTRACTS.

Last week we called attention editorially to a method of letting contracts for work on a cost-plus-percentage basis. This week we publish a letter briefly outlining a modification of this in which the percentage is graded, decreasing as the total cost of the work increases, with a limit of zero if it should reach a certain predetermined sum. Still another, the "cost-plus-a-fixed-sum" method, is suggested in a recent report by the city engineer of Columbia, S. C., a quotation from which also is given elsewhere.

Concerning the cost-plus-percentage contracts made by the U. S. Government, it may be said that observation indicates a tendency toward high cost of labor on account of the desire of both sides to hurry the work and of the contractor to have all the men possible on the job so as to finish as soon as possible, and not to be exceedingly particular about the amount of work each individual man performs or his competency, number rather than quality being to the advantage of the contractor.

The cost-plus-a-fixed-sum plan reduces the tendency toward crowding the work with incompetent men, since the size of the total payroll has no direct effect upon the

compensation of the contractor. There is no particular incentive, however, toward economical handling of the job, and it is to the contractor's interest to work all the men he can and to keep them on the job during slack periods under some excuse so that they will always be on hand when needed. If the engineer or the city fixes the date of completion of the contract he cannot safely regulate too closely the class and amount of labor employed and the method of execution, and a contractor can make much trouble or delay or expense if he is not satisfied with the manner in which he is regulated, by means which are hard to define or to control.

One suggested modification is the offer to the contractor of a percentage of the saving over the estimated cost. Where bids are received upon the lump-sum plan and also on the cost-plus-a-fixed-sum plan, this modification can be made readily and will give the contractor an incentive to manage his work well and attend closely to all details, where the profits are almost always made or lost. The lump-sum bid under present conditions gives the total cost of the work on the usual plan, plus the factor of safety which the contractor puts on to cover possible increases in cost of labor and trouble in getting materials at agreed prices. The cost-plus-a-fixed-sum bid gives the profit the contractor thinks he is entitled to for the use of his machinery and appliances and his own time, skill and insurance that the work will be satisfactorily completed, without laying the city liable to undue damage or expense from any cause arising out of the prosecution of the work.

If, under the latter plan, the city furnishes the materials, the contractor has no special incentive to be careful of them and may waste considerable amounts by inattention to detail and by too great a desire to have a full supply so that the progress of the work shall not be delayed. If the city should offer the contractor a certain percentage of the amount he could save by constructing the work for less than the lump-sum bid, he would have an incentive to operate the contract in the most economical manner. He should be given the opportunity to make a saving in materials used as well as in labor, whether he or the city furnishes the materials.

The percentage of such prospective saving which the contractor should receive should be determined after a careful study of the circumstances of the particular case. It is not necessary that the percentage should be the same on materials as on labor. Several points are to be considered. If the lump-sum bid is much higher than the engineer's estimate, the contractor's percentage should be less, because the uncertainty is removed. This may affect the percentage of the saving on labor but not that on material, or it may affect both. The amount of control over class and amount of labor, method of execution, and time of completion may affect the profits. Ordinarily the contractor, if as expert as he should be to receive such a contract, can be depended upon to do the work in the most economical way which, to him, will probably mean the quickest way, and the most definite engineer's control provided in the contract should be over the quality of the work, with penalties for waste of material and labor by unauthorized or careless construction.

In states where the contract must go to the lowest bidder, the control provisions in the contract must be much more definite and severe than where the contractor can be chosen for his competency rather than for the low profit which he is willing to work for. Indeed, the chances for success of the cost-plus-a-fixed sum plan are not good if the contract must go to the lowest bidder without reference to his competence. The cost of the work is quite sure to be high and the quality will not be higher than the ability of the contractor. Waste of time and of materials is almost sure to be excessive. Such a contractor could not earn a percentage of a saving because he would not be likely to make any saving if the contract gave the engineer as thorough control of quality of work and method of execution as it should. A thoroughly competent contractor at a higher percentage of profit might actually save the city money in both materials and labor, especially if he receives a reasonable percentage of any saving he may make from a lump-sum bid or engineer's estimate.

It has usually been assumed that the division of the saving should be half to each party, but this is seldom the case, and at the present time it will probably be decided after careful consideration of all the factors in the case, that the contractor's percentage of the saving should be materially less than half, mainly because of the elimination of the uncertainty about future prices and wages.

SEWER CONTRACT ON COST-PLUS-FIXED-SUM BASIS.

In reporting to the city council of Columbia, S. C., recently on the construction of 6¾ miles of sewer, including rock excavation and trestles, city engineer T. Keith Legare made the suggestion quoted below. The city is to receive bids on both lump sum and cost-plus-fixed-sum basis on September 25th.

On account of the unusual and uncertain cost of labor at this time and because of the difficult construction, contractors will probably bid high on this work; therefore, I suggest that the contract be on the basis of cost plus a fixed sum. Under this form of contract the contractor agrees to furnish all labor and complete the entire undertaking by a certain date at its actual cost plus a fixed and stated sum to cover the contractor's profit and other specified items. The contractor is to furnish at his own expense all tools, appliances or machinery necessary or proper for performing and completing the work and to maintain same; also workmen's compensation and public liability insurance. It would be to the contractor's interest to execute the work as quickly as possible, in order that he may earn his commission or profit within the shortest practicable time. Under this plan the city may regulate the class and amount of labor employed and the method of execution. It would be the tendency of the contractor to do the work in the most satisfactory and efficient manner, as his self-interest is involved in that of the city. If the cost of labor should become less at any time, which it probably will in a few months, the city will receive all the benefit therefrom. Proposals should be considered only from contractors experienced in sewer construction and who have the necessary organization and equipment. The city should purchase and furnish the contractor with all material needed for the work.

COST-PLUS-GRADED-PERCENTAGE CONTRACTS.

September 15, 1917.

The Editor, Municipal Journal,
New York City.

Sir: The arguments deduced by you in your editorial on page 257 of your issue of September 13, "Cost-Plus-Percentage Contracts" are sound, but perhaps apply more forcibly to a method of letting contracts other than on a straight cost-plus-percentage basis.

There is a method evolved and advocated by Mr. C. F. Graff, a contractor of Seattle, Wash., which is far more satisfactory than the cost plus a percentage or the cost plus a lump sum basis. It consists essentially in guaranteeing a limiting lump-sum expenditure to the client for the work, at which figure the contractor's profit will be either zero or a minus quantity, and naming as possible actual costs a number of other smaller and regularly decreasing sums with a regularly augmenting sliding scale of percentage thereon to be added for contractor's profit, the latter being so arranged that the client and the contractor will share by another sliding scale the difference between the greatest possible price and the actual cost, the greater the saving the larger the percentage thereof to go to the client. Excepting the lump-sum and unit-price

method, **in normal times** there can be conceived no fairer or more systematically adjusted means of letting contracts than this. The client is protected by bond against excessive expenditure, and the contractor is given the best possible incentive for keeping the cost down to the lowest practicable limit. The client, of course, must be allowed to audit the contractor's accounts, even to the extent of retaining an inspector and auditor on the work from start to finish, to make sure that all payments for labor and materials are **bona fide** and that all the construction is done thoroughly and economically.

The above-mentioned method of letting contracts is described in detail on pages 1584-1586 of Dr. Waddell's "Bridge Engineering," where a contractor's cost and profit table for an actual percentage bid is reproduced with the bidder's detailed description of his proposal.

Yours very truly,

F. H. Frankland,
Associate Engineer,
Waddell & Son, Consulting Engineers.

REDUCING BUFFALO'S WATER WASTE

Material Reduction of Rate of 325 Gallons Per Capita Being Effected by Systematically Locating and Stopping Leaks and Wilful Waste.

Buffalo, N. Y., has for many years led all the cities of the world in at least one respect—possibly in others—its per capita consumption of water has been exceeded by no municipality except possibly a few very small ones where certain unusual contributing conditions affected this rate.

In no year, we believe, has Buffalo's average consumption fallen below 300 gallons per capita. Apparently the city officials were in no way disturbed by the fact that this pre-eminence was costing the taxpayers hundreds of thousands of dollars every year.

With the inauguration of the present commission form of government and the present officials, however, new ideas on the subject seem to have been brought to bear. The officials realized their responsibility for the fact that this large additional expenditure was employed not only in giving the people water to waste at will, but also in paying for negligence on the water department's part in permitting a large part of the water to escape underground through leaks without even giving the taxpayers the satisfaction of hearing it escape continuously through their leaky plumbing fixtures. Consequently the commissioner of the Bureau of Water, George C. Andrews, who was appointed by A. W. Kreinheder, commissioner of public works, after the inauguration of the present commission form of government, determined to discover where such losses occurred, with a view to remedying them, and several months ago the Pitometer Co. was engaged to make a survey of the distribution system. The company a few days ago submitted a progress report of results obtained by the survey conducted in one section of the city.

For the purpose of the investigation the first section was divided into seven districts, each of which was considered separately. The average daily consumption of the entire section was found to be 12,680,000 gallons, with a minimum night rate of 9,824,000, or 78 per cent of the total.

The underground surveys revealed numerous leaks, many of which have already been located and stopped, while others will be as soon as possible. It also served to indicate where house-to-house inspection for waste was most needed, and such inspection has been followed by elimination of much fixture waste and leakage. For instance, in one school house that was closed for the summer the toilets were found to be running continuously at a rate of about 50,000 gallons a day.

A comparison of the total pumpage for the month of August, 1917, with that of August, 1916, shows a reduction in the entire city of 11 million gallons a day. About three millions of this was due to the reduction by about fifty per cent of the amount of water flowing in the 130 horse troughs in the city. Also an increase in meter rates has probably caused a reduction in wilful waste by industrial consumers. But certainly half or more was the direct result of the pitometer survey, and most of the remainder was an indirect result. In the first section alone, leaks have been stopped that gave a measured discharge of 774,000 gallons a day, and an additional 419,000 gallons of leakage has been located. The reduction in pumpage named meant a saving of $2,700 in fuel alone for that month.

In one district there were located 71 underground service leaks and 489 fixture leaks; in another, 56 underground and 667 fixture leaks. In all, 179 underground service leaks had been located up to September 1st. The investigators believe that if the work of discovery and cure be continued for the rest of the year, before next spring the consumption will be reduced by such an amount that one of the pumping stations can be closed down and placed in reserve.

The reduction in cost of pumping is not the only result of the investigation, but the pressure in the mains has been raised also. This is a natural result of the decrease in consumption, but other results of the investigation have contributed. For instance, it was discovered that a gate on a 20-inch line, one of the main feeders of the distribution system, had been closed, probably for years, and opening this added 20 pounds to the pressure.

JOINT LEAKING 100,000 GALLONS A DAY
Did Not Show on the Surface.

The WEEK'S NEWS

State Highway Developments in Virginia, Ohio and Illinois—Activated Sludge Plant for Jersey City—California Plans Big Fight Against Venereal Diseases—Child Hygiene Work Reduces Mortality—Water Measurement in Syracuse—High Bids on San Francisco Aqueduct—Companies Win Little in Indianapolis Surcharge Case—Tacoma Firemen Win Two-Platoon System—Banking City Funds in Tampa—Organizing for Rapid Transit in Cleveland and Cincinnati.

ROADS AND PAVEMENTS

Enforcing of Road Law.

Charleston, W. Va.—The authority of peace officers and county road patrolmen to enforce the several provisions of the new road law was recently set forth in an opinion by the attorney-general in reply to a query from chairman A. D. Williams, of the state road commission: "As a general proposition," attorney general England, says, "sheriffs, deputy sheriffs, constables, justices of the peace, and like officers are conservators of the peace, and as such have all the common law authority of peace officers to make arrests for crimes or misdemeanors committed in their presence." The specific question asked of the attorney general related to the right of these officers to arrest, without a warrant, persons driving motor vehicles without license or without lights, or doing anything else which would be a violation of the road law. That they have this right in regard to offenses committed in their presence is declared in the opinion. "The authority of the road patrolmen," the opinion continues, "is not so clear as that of sheriff and like elected officers who are made conservators of the peace by statute. However, the provision of the road law which says 'such patrolmen shall have general police supervision over all roads within his magisterial district,' would seem to indicate that it was the intention of the legislature to make him a kind of policeman, and I am inclined to the opinion that he would have the right as a police officer to arrest persons violating any provisions of the road laws for which a penalty is provided in the nature of a punishment, or where it is a misdeameanor, without warrant, and take the offender before a justice of the peace for trial."

Ocean to Ocean Highway Mapped.

Colorado Springs, Colo.—The Pike's Peak Ocean to Ocean highway has now completed a new route from the Atlantic to the Pacific coast. The last link in the chain was forged at San Francisco when the national officers in conference with representatives of various California routes selected the Feather River-Sacramento Causeway routes and established the Pacific coast terminus at Oakland and San Francisco. With termini on the Atlantic seaboard both at New York city and Philadelphia, the first prong passes through Newark and Morristown, N. J., Easton and Allentown, Pa., joining with the Philadelphia prong at Reading, Pa., thence continuing westward along the William Penn highway through Harrisburg, Tyrone, Altoona, to Pittsburgh; crossing Ohio through Steubenville, Coschocton, Newark, Columbus, Springfield and Dayton; Indiana through Richmond, Indianapolis, Rockville; Illinois through Decatur, Springfield, Jacksonville, Griggsville; Missouri through Hannibal, Macon, Chillicothe, St. Joseph; Kansas through Hiawatha, Belleville, Norton, Colby, Goodland; Colorado through Burlington, Limon, Colorado Springs, Manitou, Hartsel, Buena Visto, Leadville, Glenwood Springs, Rifle, Meeker; Utah through Vernal, Duchesne, Heber City, Park City, Salt Lake City, Ogden, Brigham, Lucin; Nevada via the Overland Trail through Elko, Winnemucca, Lovelock, Reno; and California through Portola, Quincy, Oroville, Marysville, Sacramento, Martinez, Berkeley, Oakland and San Francisco. The completion of the western extension of the highway followed an official inspection trip made by president C. F. Adams in accordance with the decision of the midsummer meeting held on top of Pike's Peak. Reports made on the inspection trip indicate that less than 10 per cent of the 1,600 miles between Colorado Springs and San Francisco is in poor condition. A campaign is now being conducted to complete the marking of the Pike's Peak trail from coast to coast. The national specifications require red-and-white bands each 10 inches in width, at crossroads, forks and frequent intervals between, these to be painted on telephone poles, fence posts, trees or rocks. In addition, a striking marker design in red-and-white has been adopted and 1,500 enameled steel signs, 14x20 inches in size, are to be placed on individual posts at intervals of not more than five miles between New York and San Francisco. The Pike's Peak Ocean to Ocean highway association was organized at St. Joseph, Missouri, in March, 1914, and has perfected its trans-continental organization through a federation of state divisions, and there is now in each state from New Jersey to California an active division.

Convicts to Make Paving Brick and Road Signs.

Columbus, O.—It is now planned that the convicts in the Ohio penitentiary make the automobile license tags for the state and devote their extra time to making highway signs. These signs may be sold to the political subdivisions of the state at cost. The road signs of Ohio are in very bad condition. The governer has conferred upon the matter with the state board of administration, warden Preston E. Thomas of the penitentiary and with members of the state board of highway advisers. All agreed that the plan shall be carried out if an investigation discloses there is a good chance for success. It is believed that good roads organizations, farmers' associations and automobile clubs will take up the project and help to put it through. The conference agreed upon a method whereby the state will use for highway purposes the brick made by prisoners at the state prison plant at Junction City. This plant has been idle since last fall, but will now be started up at full capacity and will make 28,000 bricks a day. William McClain Arehart, of Roseville, has been named superintendent and a big force of prisoners will be assigned to his direction at once. As 375,000 brick are needed for a mile, the state will be able to turn out enough for two miles of road every month.

Road Fund Distribution in Illinois.

Springfield, Ill.—The funds made available by equal appropriation from the federal government and the state of Illinois have been definitely allotted by the department of public works and buildings, acting in conjunction with the board of highway advisers, as follows: $1,413,000 to the National Trails Old Road, beginning at the Indiana state line and connecting Marshall, Greenup, Effingham, Vandalia, Greenville, Collinsville and East St. Louis; $1,020,000 to the Lincoln Highway, connecting Chicago, Wheaton, Geneva, DeKalb, Rochelle, Dixon, Sterling, Morrison and Fulton; $2,215,000 to the Chicago-Springfield road, connecting Chicago, Joliet, Ottawa, Morris, La Salle, Peoria, Mason City and Springfield; $958,000 to the Springfield-East St. Louis road, connecting Springfield, Carlinville, Staunton, Edwardsville and East St. Louis; $614,000 to the Dixie Highway, connecting Chicago, Chicago Heights, Momence, Watseka and Danville; $400,000 to the road from Chicago to the Wisconsin line, connecting Chicago, Waukegan and Zion City. These allotments cover the amount to be received to and including July 1, 1920, available as follows: July 1, 1917, $1,326,000; July 1, 1918, $1,326,000; July 1, 1919, $1,765,000; July 1, 1920, $2,209,000. It is estimated

that the amounts allotted will pay two thirds of the cost of the improvement of each road. The counties through which the roads pass will be expected to furnish the remainder of the cost. Construction will not be commenced on any road until a sufficient amount has been so provided to complete the route through its entire length. Preference in starting construction will be given to the roads in the order in which the money for the completion of the entire road is provided. If the people shall approve the $60,000,000 bond issue at the November, 1918, election, those counties contributing to the cost of these roads will be entitled, as provided by law, to reimbursement from that fund for money contributed. The present state aid allotment may be used by the counties to assist in financing these roads and should the state bond issue fail, future state aid allotments may be used to reimburse counties to one-half of the amount contributed. Inasmuch as no part of a road will receive separate consideration, it is suggested that the county officials and others interested effect an organization for carrying out this plan. The division of highways will furnish a representative to be present at such meeting and confer as to the details of the plan.

SEWERAGE AND SANITATION

Important Conviction for Milk Law Violation.

New York, N. Y.—Suspecting that raw milk was being fraudulently labeled and sold as pasteurized milk by a milk dealer of Middle Village, borough of Queens, an inspector of the health department's Bureau of Food and Drugs quietly placed a poster seal on the pasteurizing apparatus and watched what would happen. It was impossible to use the apparatus without breaking the seal. Nevertheless, the seal was found intact the next day, and the second day after, although during this time forty-four cans of milk were sold by the dealer labeled "Pasteurized at Middle Village, 24th day of February, between the hours of 8 and 12 A. M." Moreover, inspection showed conclusively that the apparatus had not been used. The dealer was of course at once criminally prosecuted for violation of the Sanitary Code, the case coming to trial in the Court of Special Sessions, Manhattan. The court found the defendant guilty and imposed a fine of $500.

Propose Activated Sludge Plant.

Jersey City, N. J.—Having submitted to the state board of health plans and specifications for the proposed trunk sewer from Dover to a point below the Boonton dam, city authorities are now proceeding to prepare plans and specifications for the treatment of the sewage effluent to be discharged into the Rockaway River. These plans, as tentatively agreed upon at a meeting of the state board, will provide for the activated sludge system of treatment, which is favored by Jersey City and conditionally indorsed by the engineering department of the state board. It is understood that there will be no opposition of any consequence to the trunk sewer project on the part of any of the municipalities it will traverse or is intended to serve. In transmitting the plans and specifications to the state board, director Fagen of Jersey City's street and public improvement department wrote a letter in which he said: "This department has had under consideration for some time past the various methods of sewage disposal. We have arrived at the conclusion that under all circumstances, the activated sludge method is the one most suitable. As a basis for that conclusion, I beg to submit herewith copy of report made to me by George A. Johnson, sanitary engineer. My reason for submitting to you the proposed plan is that I understand there has been some criticism of the activated sludge experimental plant installed at the Liondale Print Works (at Rockaway). It is Jersey City's desire to secure that type of treatment which above everything else will result in returning to the river the best possible effluent obtainable. Mr. Johnson's advice to me is that the suggested method will secure such a result." Mr. Johnson's letter to director Fagen assigned the following reasons for recommending the use of the activated sludge process: "The effluent obtainable from this process will be highly satisfactory, so far as its physical and chemical characteristics are concerned. Sterlization with chlorine compound will insure high bacterial purity. Low electric current costs at this plant justify the adoption of this process on economic grounds. The sludge resulting from this treatment has a high manurial value and probably can be disposed of at an actual profit to the city." In presenting the plans to the state board, corporation counsel Milton informed the department that within sixty days after approval by the state board plans for carrying on the work would be completed, although actual construction could not begin before next spring. He said construction of the proposed sewer would be undertaken, notwithstanding any litigation in which Jersey City and the East Jersey Water Company might become involved. This presentation of plans by Jersey City marks the apparent conclusion of a problem of more than five years' duration. Originally Jersey City agreed with the municipalities, Wharton, Dover, Rockaway and Boonton, to construct such a system, the towns along the route of the Rockaway River, whose sewage now finds its way to Jersey City's potable water supply, to construct their own laterals. Dover was ready to sign up, but later Rockaway balked, and the change to commission government in Jersey City brought a change of front in that municipality, which later vainly sought to have these towns forced to maintain sewage systems of their own. Jersey City still hopes that it will be able to bring about the reversal of a decision of the Chancery Court eight years ago, when the city was defeated in its endeavor to compel the Jersey City Water Supply Company to construct the sewerage system. The court had previously held that the company, which built the water plant, must construct the sewer system in fulfilment of its contract obligation to give the people of Jersey City a pure and wholesome supply of water. When later the company produced experts to swear that the chlorine treatment would be sufficient to comply with the terms of the contract, the court accepted the evidence and found against the city.

Vigorous Campaign Against Venereal Diseases.

Sacramento, Cal.—The physical examination of every woman arrested on a charge of prostitution, whether she be fined or released, is proposed by the Bureau of Venereal Diseases, which has been established in California by the State Board of Health through the recommendations of the State Welfare Commission. Dr. Wilbur A. Sawyer, secretary of the State Board of Health, has established a central bureau in San Francisco, where he temporarily is in charge, assisted by Dr. A. F. Gillian, newly appointed health officer for the North Coast District. Already the work of co-operating with Federal officers in isolating venereal cases in and around military camps is under way, with the aid of both the army and naval services at San Francisco, Los Angeles and San Diego. Not only will the men be taken care of with a view to safeguarding the interests of the civilian population as well as keeping the soldier's life clean and of high moral character, but women wherever arrested for prostitution will be compelled to submit to the same examination. With the establishing of branch bureaus throughout the state, the State Board of Health expects ultimately to include every section of the state in its campaign to wipe out venereal diseases.

"A Baby Saved Is a Citizen Gained."

New York, N. Y.—That stillbirths can be reduced 22 per cent and deaths of babies during the first month after birth can be reduced 28 per cent is the contention made in a statement issued by the New York Milk Committee. This is based on a report just published of an experiment in the care of expectant mothers covering a period of four years, and the results are compared with corresponding statistics of the borough of Manhattan, New York city, during this period. The report of this effort to prevent deaths of mothers from causes due to pregnancy and confinement, to prevent stillbirths and deaths of infants during the early weeks of life, is issued under the timely caption, "A Baby Saved Is a Citizen Gained." This intensive maternity care program was started in 1912 and continued to the end of 1916. During this period 3,145 expectant mothers were enrolled and given care and supervision averaging 3½ months

before and 1 month after confinement. Each mother was visited in her home every ten days by a specially trained nurse and by a physician whenever it was necessary. Besides this care every mother was given clinical consultation and physical examination and treatment for abnormal conditions before her baby was born, and supervision and care during the first month after her baby was born. When the babies were one month old they were registered at the department of health milk stations. Much attention was also given to co-ordinating the activities of the various agencies whose co-operation and services were needed for the health of the expectant mother and her family. In this period 3,192 babies were born to the 3,145 mothers under observation. Of these 115 were stillbirths and 86 others died during the first month after birth. The stillbirth rate per thousand of these cases was 36 against 46 for the borough of Manhattan or a reduction of 22 per cent. The rate per thousand of deaths under one month was 28 against 39 for the borough, or a reduction of 28 per cent. Out of this whole group of mothers only 5 died, giving a rate of 1.5 per thousand mothers against a rate of 4.9 in the city at large, or a reduction in the maternal mortality rate of 69 per cent.

WATER SUPPLY

Metering Water Mains.

Syracuse, N. Y.—The bureau of water has completed the installation of recording meters on all the mains which distribute water from the Woodland reservoir through the city. Recorders were placed on the two thirty-six-inch mains some months ago and recorders have now been placed on the thirty-inch low pressure main and the twenty-four-inch high pressure, thus completing the set. It is now possible for the bureau's engineer to tell at any moment how much water is being distributed through the city and by the use of the charts to tell at what hours of the day the demand is greatest. The bureau will increase its efforts to keep track of the amount of water from which revenue is received. All regular services, including municipal buildings, are now metered. The only water outlets not now metered are the hydrants and the fire protection services in the manufacturing plants, and it is probable that some means will be devised to measure the amount of water used for fighting fires and for street flushing.

Test Liability for Frozen Pipe Damage.

Reno, Nev.—A suit that will determine the question of whether or not the Reno Power, Light and Water Company is liable for damages for the results of the cold spell which tied up the water system of Reno for forty-three days during January and February of this year has been filed in the district court. Lawrence Devencenzi, former patrolman and now conducting a green house and florist shop, is the plaintiff and the Reno Power, Light and Water company is defendant. Devencenzi asks for a judgment of $5,250, alleging that through the wilful negligence and failure of the company to bury its water pipes to a sufficient depth they froze and he was unable to get water for spraying 3,500 domestic rose bushes. He asserts that through the failure to get water the rose bushes were totally destroyed. His counsel said that the case probably will be transferred to the federal court, the defendant being a company organized and existing under the laws of California and the suit being for a judgment in excess of $1,000. The suit is being watched with considerable interest by scores of Reno people and in case Devencenzi succeeds in establishing the company's liability and secures a judgment there is no doubt that many other suits of a similar nature will be filed.

Bids Fifty Per Cent Over Estimate.

San Francisco, Cal.—The Board of Public Works has opened bids on the construction of about nineteen miles of the aqueduct in the Hetch-Hetchy water supply project. Three important local contracting firms submitted bids, only one firm, however, bidding on all the sections of the work. The bid of R. C. Storrie & Co. was $9,233,671 for all the work. The Healy-Tibbitts Construction Co. bid $2,101,950 on Section A, and the Lindgren Co. $5,916,222 on Section C. The city engineer's estimate on the work was $6,090,613, to which was added $216,387 for extra work and engineering, making a total of $6,307,000. The tunnel to be built is 10 feet 3 inches in diameter and the contractor bid about $95 per foot, including accessory structures. The city thought this bid excessive compared with the $59.80 per foot cost of a 12 foot tunnel under Lake Michigan and the 8 foot concrete lined tunnel being driven by the Marin water district at a cost of $29.70 per foot. On the recommendation of the city engineer the Board of Public Works rejected the bids. The high prices of steel and powder and uncertainty in the labor market are said to have been the most important factors in the high bids. The construction of the railroad for hauling materials to the site of the work is nearly completed. The power plant for pounding powder for the construction work is also nearing completion.

STREET LIGHTING AND POWER

Commission Grants Temporary Surcharge.

Indianapolis, Ind.—The Indiana public service commission, acting on petitions of the Indianapolis Light and Heat Company and the Merchants' Heat & Light Company for permission to make a surcharge on all bills for electric light and power during the wartime period of high operating costs, due chiefly to the cost of coal and failure to get coal on contracts, has denied the requests as a whole, but granted a temporary increase in rates to classes of large consumers. The commission refused to permit any surcharge or change of any kind in the rates for electricity to about 50,000 small consumers. Among the large consumers of electricity which the temporary surcharge will affect will be the city of Indianapolis. The company did not include the city in its petition, but the commission decided it was one of the consumers which should be affected. The commission also granted a surcharge of 25 per cent. to be added to all bills for steam and hot water heating for this season, ending next spring. The commission refused to permit any surcharge or charge of any kind to be made on the rates of all who are on suburban lines, and who pay what are known as suburban rates. The commission did, however, grant a horizontal increase on all of the large light and power users of electricity. A surcharge of 5 mills a kilowatt hour is granted for a period extending to the end of the present fiscal year, June 30, 1918. This surcharge will vary in percentage of increase, those for example, having a 5c. rate will be increased 10 per cent. for this period; those having a 2½ a k. w. h. rate will be advanced 20 per cent., and those having lower rates will have higher percentages of advance. It is specifically provided in the order that the present schedule of rates is not to be regarded as changed; that the surcharge is granted only as an addition, to be charged as a separate item for the period ending June 30, 1918—a period which will carry the companies through the heavy winter season, both as to light and heat operations and, which it is hoped, will bridge the period of extraordinary costs of production. The commission finds that the petitioners proved they are facing heavy financial losses and that they are now showing heavy deficits. The commission holds, however, that the petitioners have only proved their case in so far as the cost of production, in which item coal is the largest element. It says that they did not show any material increases in the cost of distribution and other incidentals of the business. For these reasons, if for no others, the commission finds that it would not be justified at this time in levying the surcharge on the small consumers whose 7-cent rates are little influenced by increased costs of coal and other production costs, and whose rates are made high to cover costs of distribution, collections, etc. The city was found to be one of the largest lighting consumers in Indianapolis, and it has on its large contracts a rate of approximately 2½ cents a kilowatt. Legal counsel of the city had extracted from the petitioners a promise that they would not ask the application of a surcharge to the municipal bill, and on this score the city made no appearance at the hearing, and filed no protest or objection on any grounds to the

petition for relief. It is held that any agreement entered into between the city and the petitioners is not binding on the commission, and that there could be, in the working out of justice, and equity, no solution except to include the city in the group of large light and power consumers, on whom the surcharge is authorized. It is further pointed out that the public utility law does not contemplate, and that it specifically prohibits discrimination as among certain classes of users of service. It further appears that notwithstanding the fact that the Merchants' Heat & Light and the Indianapolis Light & Heat companies have surrendered their Indianapolis franchises, and are operating under indeterminate permits, they have continued to pay to the city franchise and gross earning taxes, and that these payments to the city, which will probably aggregate $75,000 during the coming year, will be more than double any temporary relief that is thus provided. In making its estimates on which the decision of the commission is rendered, coal estimates are predicted on the recent prices for coal that have been set by President Wilson.

The commission, in its report, shows that it has conducted independent investigations. It finds that there has come on to the public utilities companies a great load, caused by manufacturers, large building managers, and other large users of power and light, abandoning their own individual power plants. The inquiry showed that this is the result of the high prices of coal and increasing costs of labor and the scarcity of both. The result of this shifting of great industries to the central power station load, has been to decrease by 3 mills the revenue per k. w. h. of the companies—this caused by the great increase in consumption of electric energy at the low or lowest rates which, according to testimony, in some instances are actually "cheaper than the cost of coal itself." "In every instance," the commission says, "the increase is registered principally in the cost of coal; the next item of increase invariably being labor. Other items showing increases are oil, waste and maintenance. This investigation was made in July, 1917, and more recent reports indicate further increases since that period. The Indianapolis users of power, and large consumers of electricity for other purposes who come under low schedule rates, undoubtedly are enjoying an advantage over such competitors and also of the utilities, which, paying war time price of production, are billing electric energy at pre-war prices." The report of the commission contains exhibits of the two companies, in which is given estimate for operations for the year ending June 30, 1918. The estimate for the Merchants' Heat & Light Company shows, without any allowance for dividend or depreciation, a deficit of $218,045. The estimate of the Indianapolis Light and Heat Company shows, without allowance for dividend or depreciation, a deficit of $178,705.01. The report also contains exhibits showing deficits for the last several months. The record shows that both of the companies are operating their hot water and steam service at a heavy loss. The commission says: "The evidence reveals that both petitions rest primarily, but not solely, on failure to get coal on contracts and on resultant advances in the cost of coal, which constitutes at present prices, according to the Merchants' Heat & Light Company, 66 2-3 per cent., and of the Indianapolis Light & Heat Company, 70 per cent. of the cost of kilowatt-hours at the switchboard." The commission, in this regard, says: "It does not intend to be placed in the position of levying on patrons a tax to absolve coal companies or other contractors of their obligations, and the relief granted in no wise shall be taken as making good any losses that might be recoverable from contractors." These two companies, following a petition by most of the other member companies of the Indiana Electric Light Association, had asked for a 30 per cent. surcharge.

Company Found to Operate Without Franchise.

New York, N. Y.—The city has practically admitted that the Edison Electric Illuminating Company, of Brooklyn, is operating in that borough without a franchise. The admission is made by corporaton counsel Lamar Hardy and comes in a modified order restraining the Edison Company from opening streets, laying conduits or stringing wires in the city of New York, with the exception of instances where such work is necessary to carry out its contract with the city. Supreme court justice Scudder, upon the application by counsel for a Brooklyn resident, signed a sweeping restraining order which prohibited commissioner William Willams of the Department of Water Supply, Gas and Electricity and borough president Pound from further issuing permits to the Edison Company for the purposes of opening the streets. It is the contention of the complainant that the Edison Company possesses no franchise to open the streets or to erect poles or string wires and that, furthermore, it is not entitled to dispense electricity for consumption. This is based upon the claim that the company is incorporated under the Manufacturing Act, chapter 40 of the Laws of 1848, and as such it is not a public service corporation and consequently is not properly incorporated to do the business which it is now carrying on. The Edison Company was not made a party to the action. The modified order which has been issued grants permission to the Edison Company to open streets and do other work in connection with its contract with the city for the lighting of the streets and public buildings.

City Officials to Fight Gas Rate Increase.

Lima, O.—In a report bristling with charges of fraud and misrepresentation, mayor Bailis Simpson and the council finance committee have asked that $10,000 in bonds be voted to fight the Lima Natural Gas Company, which recently asked a raise of five cents per thousand cubic feet. The bond ordinance was passed by a unanimous vote. The report set forth that the gas company obtained a ten-year franchise less than two years ago and practically dictated the terms of the contract; and that the company now was asking a premium to carry out those terms. It also asserted that in an extensive publicity campaign the company had misrepresented the franchise rate for gas in Lima, and in a table of rates in other cities had been guilty of frequent misstatements of fact.

FIRE AND POLICE

Win Two Platoons After Strike Threat.

Tacoma, Wash.—Determined to act unless the city recognized their demands for a two-shift system in the fire department, which would bring a reduction in working hours, firemen in Tacoma signed the "resignation list" of the new city firemen's union, which notified the commissioners that 105 employes would quit work unless the two-shift system was installed. Committees representing the union presented the list of resignations to chief Carlson. They demanded a ten-hour working day, with a night shift of fourteen hours, shifts to change each month. The controversy was settled when a committee of firemen met with the city council and suggested that the present force be divided into two shifts, which will obviate the necessity of forty-one additional men. This was a decided concession, in view of the proposed ordinance asking for an enlargement of the force. Commissioner Pettit said: "In case of fire it would leave only three men, in some cases, to handle as many pieces of apparatus. I'm content for the present, but the enlarged force will have to come sooner or later. The new system is now in effect.

"Movie" Theater Fire Prevent'on Law.

St. Paul, Minn.—Laws passed by the 1917 legislature regulating motion picture theaters have been put into effect by John B. Sanborn, state fire marshal. It is now unlawful for any person to operate a motion picture machine, or to exhibit motion pictures in any theater, hall, or building where the public is admitted, without a license. The licenses are issued by the state fire marshal only after the "movie" theater is thoroughly inspected by the department, and conforms to a number of rigid requirements. The booth in which the projecting machine is installed must be of fire resisting material, and constructed in accordance with specifications outlined in the laws. The law provides for experienced operators of such machines, who must be over 18 years of age and who in the judgment of the deputy inspecting the theater is qualified to operate the machine. The number and loca-

tion of exits, which must be properly marked and illuminated with red lights, also the location and condition of hand extinguishers and other inside fire protection, are provided for.

New Plan for Fire Inspection.

Fitchburg, Mass.—In order that the firemen may become better acquainted with conditions in all parts of the city, an innovation which has proved a decided success has been introduced in the regular monthly inspection of the sections of the city by the fire department. In each of three districts one or two extra firemen from other sections of the city accompanied the one inspector of the district, who usually makes his round alone. This plan gave five men an opportunity to become better acquainted with a district which they are likely to have to fight a fire in at some time, even though their station is not in the section. It is possible to send extra men with the firemen who regularly make the tour of inspection only when none of them are taking their one day in five off, because at that time only is it possible to withdraw a few men without crippling the work of the department. The only time when the one day off in five rule does not hold at the local fire stations comes when the month has a 31st day. On that day all the men are at their posts, and accordingly on only seven days in the year can such a plan be used.

GOVERNMENT AND FINANCE

Mayor Removed by Governor.

Minot, N. D.—The long anticipated order from the chief executive for the removal of W. S. Shaw, president of the Minot city commission, has been issued. The grounds given by the governor for his action are that Shaw knowingly permitted numerous places within the city of Minot to be maintained as places where intoxicating liquors were sold and that he "corruptly connived at the open and notorious maintenance of bawdy houses within the city limits." Assistant attorney general Dan V. Brennan has done practically nothing since his appointment last January other than to procure evidence of Minot's "viciousness," and it is upon his complaint that the governor has acted.

Torrens Title Law in Georgia.

Atlanta, Ga.—That the Torrens land title law, enacted by the legislature just adjourned, will mean more to the landowners of Georgia than any legislation ever passed, is the general opinion here. Under this law an owner of land will be able to register his title, have it certified by the court, and his certificate will be almost like a certificate of stock when he goes to borrow money. It will show at a glance the status of his title and the incumbrances, if any, outstanding, and there will be no necessity, when once he has his title registered, to employ a lawyer to make an abstract. All that is done away with entirely.

Install New Method of Handling Bank Deposits.

Tampa, Fla.—Under plans suggested by city auditor John Hansbrough and approved by the mayor and the finance committee of the council, the city has initiated a new system of handling its bank accounts. Heretofore the city has deposited with only certain banks, but beginning recently its deposits are to be divided among all the banks of the city, and two per cent interest will be required from the banks on the daily balances carried by the city. The city usually for about six months in the year carries a heavy daily balance, and for the remaining six months is a borrower, and heretofore no interest has been charged by the city on large deposits carried with the banks on account of the fact that during the second period of the year the city borrowed money at five per cent. Under the charter the city is permitted to borrow on the tax roll of the year fifty per cent of the amount assessed for any particular fund. The taxes usually come in largely during December and January and during that half of the year large deposits are carried in the banks. Mr. Hansbrough has proposed a system of retiring bond issues and handling funds for bonds that will work a complete revolution over the old methods, it is said. Most of the city bonding has been for fifty year periods, with the option on the part of the city of taking up the bonds at the expiration of thirty years. Under the plan of Mr. Hansbrough these bonds will mature in about twenty-eight years. Every fund now carried works out that way with the exception of the first bond issue, for which the administration of that time did not provide a sinking fund. This bond issue when due must be refunded. All bond issues made during the McKay administration have been provided for by a 2 per cent sinking fund. If the plans of Mr. Hansbrough are undisturbed, it is said, these bonds will be retired on a basis of twenty-eight years or less. Letters were sent out by the city auditor to all the banks in the city proposing the plan which has gone into effect. All the banks have replied agreeing. Under the new system each bank will give bond in the sum of $25,000, with the option of putting up local municipal, county or state bonds for that amount instead of an indemnity bond. The city borrowed $176,500 during the fiscal year ending June 30, on which the interest amounted to $2,731.94 at five per cent, the rate which the city has been paying. The city is now borrowing money from its sinking fund and will use $50,000 from that fund, which means a saving in interest on that amount. Since the present auditor went into office, the bonding debt of the city has grown from $570,500 to $3,150,500, during a period of fourteen years. The city paid a discount of $15,000 on the first bond issue, which sold at 95, the issue being made to provide for street and sewer improvements. On the next issue of $270,500, for refunding, the bonds ostensibly sold for par, but the city paid between $6,000 and $7,000 in commissions for negotiating the sale. Since that issue, it is said, not a cent of commissions has been paid for negotiating a bond issue. The last issue of bonds sold at the highest price in the history of the city, $1.0375. The city now owns $290,000 worth of its own bonds, bought at various times by Mr. Hansbrough, from which the city is deriving $14,500 interest per annum.

Municipal Ownership Charter Amendment Defeated.

Toledo, O.—A charter amendment which would pledge the general credit of the city for municipal ownership bonds has been defeated by a large majority at the primary election. Advocates of municipal ownership believe that this defeat was due to objection to the method provided in the amendment rather than to municipal ownership itself. There was also a question of the power of the council under the amendment. The new section of the charter proposed was as follows: "Nothing in this charter shall be construed to prohibit the city of Toledo from issuing negotiable bonds for the purpose of acquiring, constructing, or extending, any public utility and pledging the general credit and taxing power of the city as security for the same. Such negotiable bonds pledging the general credit and taxing power of the city for the purpose of acquiring, constructing or extending any public utility may be authorized by ordinance initiated by the electors or by resolution or ordinance of the council, subject to the provisions of this charter. In the event that any initiated ordinance, if one there be, fails to fix the amount, terms and form of bonds authorized, the council in such cases, and in all other cases, shall fix the amount, terms and form of all such bonds authorized and shall do, or cause to be done, all other things not expressly authorized, that may be necessary or proper to make such bonds valid and binding obligations for the purpose for which they are authorized." The Toledo Clearing House Association, composed of the local banks, opposed the proposed amendment in paid space in the newspapers. It said: "It is apparently the purpose of the proposed amendment to grant to council powers which it does not now have, and enable it by simple resolution to purchase any public utility and issue bonds therefore in any amount, to any maturity and at any rate of interest, and make the same a general obligation of the city, secured by pledge of the city's entire taxing power which will affect the property of every taxpayer in the city of Toledo. There is sufficient doubt in our opinion as to whether such action of council will be subject to a referendum vote of the taxpayers to make the proposed legislation fraught with very dangerous possibilities to the future finances of the city." A proposal to issue $580,000 worth of general credit bonds for the purpose of extending Summit street received 1,000 less than a majority vote.

TRAFFIC AND TRANSPORTATION

Want Subway Commission for Cleveland.

Cleveland, O.—There has been presented by citizens to the city council an ordinance providing for the appointment of a subway commission by the mayor and the issue of $3,500,000 of bonds for the construction of a subway in West Superior avenue and underground street railway terminals at the Public square. This was accompanied by a petition containing more than the requisite number of names, asking for its submission to the voters, unless approved by council. The ordinance has been referred to the committee on street railways.

Appoints Street Railway Commissioner.

Cincinnati, O.—The Board of Rapid Transit Commissioners has approved mayor Puchta's appointment of C. W. Calkins as city street railway commissioner and he has already assumed his duties. The new commissioner was formerly executive secretary of the local chamber of commerce. His duties will include the administration of the orders of the mayor and the rapid transit commission according to the terms of the rapid transit loop ordinance. He will receive complaints and make recommendations concerning service, and will advise on the subject of extensions and other matters.

MISCELLANEOUS

Municipal Docks for Mobile.

Mobile, Ala.—The voters, by a big majority, have approved the proposition which authorizes the city commission to issue $600,000 worth of bonds for the building of municipal docks. It is planned to construct concrete wharves, piers and bulkheads and railroad connections with the water front structures. Dredging is to be done to a depth of thirty feet. The construction of warehouses is contemplated in the future, but their cost is not included in the $600,000 appropriation.

New Housing Law in Effect.

Sacramento, Cal.—The three new state laws regulating the construction, occupancy and sanitation of tenement or apartment houses, hotels and private dwellings, which were prepared by the State Commission of Immigration and Housing are now effective. The commission's housing bureau is preparing a state housing manual explaining and amplifying the provisions of the laws by cuts, drawings and annotations. In this manner it is hoped to make the laws as readily understood by the layman as by the professional or technical persons who use them. The bureau is also sending out notices to the mayors, health and building departments of the various cities and towns; also to the district attorneys of the various counties directing their attention to the fact that they are charged with the duty of the enforcement of the laws in their respective cities and counties and urging that they see that the laws are consistently and effectively enforced. The state housing commission is authorized to enforce the laws anywhere in the state where city or county officials fail, neglect or refuse to do so. The commission further expects not only to assist the cities and towns in seeing that the laws are uniformly and impartially enforced, but also intends to help the cities in organizing and reorganizing their municipal forces so that a uniform and effective program will be instituted to the end that all places where human beings reside are erected and kept up in conformance to the provisions of the new state housing laws. The housing bureau will also assist the cities in preparing and having enacted by their local legislative bodies building, housing, city planning and zoning ordinances, and will act as a clearing house for all questions that may arise pertaining to the subject. Briefly, the provisions of the new state housing laws fix the minimum size of rooms used for human habitation, provide that they have windows opening to the outer air, fixing the minimum size of windows based in ratio to the floor area; provide for unoccupied spaces; such as yards, courts and a certain percentage of the lot; require that all plumbing be sanitary; fix the minimum number of water closets, slop sinks and similar conveniences, require a given number of stairways, fire escapes and other means of egress for use in case of fire, limit the height of buildings according to the materials used in their construction. The law absolutely prohibits so-called "dark rooms"—i. e., rooms without windows opening to the outer air and stringently restricts the erection of so-called "rear tenements" and "rear hotels"; provide for privacy and cleanliness and sanitation of not only the buildings, but of the surrounding premises. A novel and original method was used in preparing the laws. A year and a half ago the commission completed a very careful investigation of housing conditions throughout the state. This investigation proved the need of practicable and enforceable laws upon the subject. The commission then, with the approval of the governor, invited the fourteen largest cities in the state to participate in a series of conferences for the purpose of studying and discussing all phases of the housing problem and to draft such legislation as was deemed necessary to solve the problem. Twelve of the cities responded by naming official delegates—some thirty in number—including supervisors, councilmen, city attorneys, health, housing and building commissioners and inspectors. A great number of organizations, such as the engineers and architects, city planning and housing associations, chambers of commerce, realty boards, labor and medical organizations and similar bodies joined with the delegates from the cities and the commission in a state housing institute. The institute held four meetings in different parts of the state and carried on an educational program through public addresses and press notices. At these meetings the subject of housing was thoroughly covered. Tentative drafts of the laws prepared by the commission's experts upon the subject were discussed, clause by clause, and as a result the three laws which are soon to become effective were evolved, presented in the legislature and enacted into laws by the legislature.

LEGAL NOTES

A Summary and Notes of Recent Decisions—Rulings of Interest to Municipalities

Police Power—Lateral Support.

New York Sup.—Ordinance requiring one making excavations to sheet pile, to prevent removal of lateral support, and to repair all damages, being in harmony with the common-law rule, held valid exercise of city's police power.—Bergen v. Morton Amusement Co., 165 N. Y. S. 348.

Drains—Contamination of Pond.

Wisconsin—Where abutting owners constructed drains on village streets, the village was not liable to a property owner who claimed his ponds and stream were thereby contaminated.—Crystal Spring Brook Trout Hatchery Co. v. Village of Lomira, 162 N. W. 658.

Leasing Public Auditorium.

Minnesota—Where an auditorium in a building erected for municipal purposes is no longer needed for public use and its lease will lighten taxation, the municipality may lease it for private use.—Anderson v. City of Montevideo, 162 N. W. 1073.

Police Power—Sale of Deadly Weapons.

Illinois—A municipal ordinance regulating sale of deadly weapons, and requiring prospective purchasers to secure a permit from chief of police on proof of good moral character, is not invalid because of delegation of legislative authority.—Biffer v. City of Chicago, 116 N. E. 182.

Relative Rights of Vehicles and Pedestrians.

Iowa—The relative rights of vehicles and pedestrians in the public streets are equal, one having no rights superior to the other, save as declared by statute or ordinance, and it is no more the duty of the driver of vehicles to continually look out for pedestrians than of the latter to look out for vehicles.—Rolfs v. Mullins, 162 N. W. 783.

NEWS OF THE SOCIETIES

Calendar of Meetings.

Sept. 18-20.—LEAGUE OF IOWA MUNICIPALITIES. Annual convention, Iowa City. Secretary, Frank G. Pierce, Marshalltown, Ia.

Sept. 18-20.—LEAGUE OF VIRGINIA MUNICIPALITIES. Annual convention, Lynchburg, Va. Secretary, L. C. Brinson, Portsmouth, Va.

Sept. 19-20.—UNION OF ALBERTA MUNICIPALITIES. Annual convention, Calgary, Alberta. Secretary, J. D. Saunders, Camrose, Alberta.

Sept. 24-28.—CALIFORNIA CONFERENCE ON CITY PLANNING. Annual conference, Santa Rosa, Cal. Secretary, Charles H. Cheney, Crocker Building, San Francisco, Cal.

Sept. 24-29.—LEAGUE OF CALIFORNIA MUNICIPALITIES. Annual convention, Santa Rosa, Cal. Secretary, Wm. J. Locke, Pacific Building, San Francisco, Cal.

Sept. 24-29.—THIRD NATIONAL EXPOSITION OF CHEMICAL INDUSTRIES. Exposition, Grand Central Palace, New York City.

Sept. 25-27.—SMOKE PREVENTION ASSOCIATION. Annual convention, Columbus, O. Secretary, Frank A. Chambers, City Hall, Chicago, Ill.

Sept. 25-27.—LEAGUE OF WISCONSIN MUNICIPALITIES. Annual convention, Racine, Wis. Secretary, Ford H. MacGregor, Madison, Wis.

Sept. 27, 28.—CANADIAN PUBLIC HEALTH ASSOCIATION. Annual congress, Ottawa, Ont. Secretary, J. G. Fitzgerald, M. B., Toronto, Ont.

Sept. 27-29.—AMERICAN AND CANADIAN ENGINEERS AND ARCHITECTS OF NORWEGIAN BIRTH OR DESCENT. Informal congress and re-union, Chicago Norske Klub, Chicago, Ill. Chairman, Committee on Arrangements, Joachim G. Glaver, consulting engineer, Chicago, Ill.

Oct. 10.—UNION OF BRITISH COLUMBIA MUNICIPALITIES. Annual convention, Duncan, B. C. Secretary, Ex-Reeve H. Bose, Survey Center, B. C.

Oct. 15-17.—NATIONAL HOUSING ASSOCIATION. Annual conference, Hotel La Salle, Chicago, Ill. Secretary, Lawrence Veiller, 105 East 22d St., New York City.

Oct. 16-19.—LEAGUE OF KANSAS MUNICIPALITIES. Annual convention, Wichita, Kan. Secretary, Homer Talbot, University of Kansas, Lawrence, Kan.

Oct. 17-18.—LEAGUE OF MINNESOTA MUNICIPALITIES. Fifth annual convention, St. Cloud, Minn. Secretary-treasurer, Richard R. Price, University of Minnesota, Minneapolis.

Oct. 17-19.—AMERICAN PUBLIC HEALTH ASSOCIATION. Annual meeting, Washington, D. C. Acting Secretary, A. W. Hedrick, 126 Massachusetts Avenue, Boston, Mass.

Oct. 22-24.—AMERICAN CIVIC ASSOCIATION. Annual meeting, St. Louis, Mo. Secretary, Richard B. Watrous, 914 Union Trust building, Washington, D. C.

Oct. 28-30.—TEXAS CONFERENCE ON SOCIAL WELFARE. Annual convention, Houston, Texas

Nov. 19-24.—CITY MANAGERS' ASSOCIATION. Annual meeting, Detroit, Mich. Secretary, W. L. Miller, City Manager, St. Augustine, Fla.

Nov. 20-23.—PLAYGROUND AND RECREATION ASSOCIATION OF AMERICA. Recreation Congress, Milwaukee, Wis. Secretary, H. S. Braucher, 1 Madison Ave., New York, N. Y.

Nov. 21-24.—NATIONAL MUNICIPAL LEAGUE. Twenty-third annual meeting, Hotel Statler, Detroit, Mich. Secretary, Clinton Rogers Woodruff, 703 North American Bldg., Philadelphia, Pa.

Jan. 15-17.—VIRGINIA GOOD ROADS ASSOCIATION. Seventh annual convention, Richmond, Va. Secretary, C. B. Scott, Richmond, Va.

Feb. 6-13.—FIRST CHICAGO CEMENT MACHINERY AND BUILDING SHOW. Supersedes annual Chicago Cement Show. Held at the Coliseum, under direction of the National Exhibition Co.

Pennsylvania League of Third Class Cities

The annual convention of this league was held at Harrisburg, Pa., August 29 and 30. Erie was selected as the place for the next convention, which will be held in August, 1918. Three cities were willing to have next year's convention, including Hazleton and Coatsville. Fifteen cities favored Erie and four favored Coatsville, and Erie was made the unanimous choice.

The Erie convention will be most important, because at that session the fruits of the work of several special committees created to conduct a campaign to foster and encourage proposed amendments to the commission form of government act will be announced.

Mayor Miles B. Kitts, of Erie, was elected president of the league; Fred H. Gates, city clerk of Williamsport, was re-elected secretary, and William H. Lynch was elected first vice president. R. R. Seaman, city clerk of Harrisburg, was elected treasurer.

A resolution adopted at the closing session of the convention criticises the Legislature for "pickling" the Ramsey bill, which was indorsed and recommended by the league. Twenty-seven honorary vice presidents were elected, including one representative from each city in the league.

The report of the law committee was a resume of the new acts of Assembly. The paper read by City Engineer B. M. Cowden who criticised the method of making street paving assessments, caused a long discussion. Mr. Cowden believes schools, churches and cemetery associations should not be exonerated from paying paving assessments. The convention was so taken with his suggestions that the paper was referred to the law committee with the advice that Mr. Cowden's idea be incorporated in proposed legislation.

Dr. John M. J. Raunick, city health officer, told the convention about food inspection in Harrisburg; the system of levying license taxes and the method of making food tests, and gave much interesting data showing how the capital city traces the source of smallpox and typhoid fever. Mr. Cowden described the workings of the city planning commission of Harrisburg in an interesting paper that showed how the commission is planning for the future growth of the city. This dealt with the commission's rigid enforcement of regulations governing the width of streets and alleys in plots laid out in territory adjacent to the city.

One of the most interesting and instructive addresses was that given by William D. B. Ainey, chairman of the Public Service Commission of Pennsylvania, on "The Relation of Public Utilities to Third Class Cities." He outlined in detail just what service the commission can be to these cities, and expressed the desire for all of the delegates to call at the offices of the commission to further learn of its work. Mayor Kitts, of Erie, told how pleased that city was with the assistance that the commission has given in the past.

"The Workmen's Compensation Law" was the subject of an interesting talk by George C. Klauder, referee of the Workmen's Compensation Board, Philadelphia. He told of the usefulness of this service to cities such as Harrisburg. The other address of the afternoon was given by Cyrus D. Foss, Jr., secretary of the Civil Service Reform Association of Pennsylvania. He spoke on "The Civil Service Administration in Cities of the Third Class." He had a mass of valuable information for the delegates.

An interesting paper was read by James Sweeney, chief of the State Bureau of Standards, dealing with "Weights and Measures," and another by James A. Gardner, chairman of the law committee, but after all the delegates seemed to attach much interest to round table discussions about how they had been baffled by the last Legislature, which ignored their recommendations for proposed new legislation.

International Association of Municipal Electricians

The twenty-second annual convention of the International Association of Municipal Electricians was held at the Cataract House, Niagara Falls, Sept. 11 to 14.

A resolution bearing upon concentric wiring was passed at the close of the second day's session on Wednesday. It was offered by W. H. Flandreau, Mount Vernon, N. Y., a member of the sub-committee on bar grounded-return wiring systems, which reported March 1, last.

The resolution says that such systems have great demonstrated disadvantages and no demonstrated advantages from the standpoints of life and fire hazard as compared with present systems of wiring in this country, and that they do not comply with the rules of the National Electrical Code and the National Electrical Safety Code, which meet in a satisfactory degree all conditions obtaining in this country for the best protection of life and fire hazard conditions in step with the progress of the electrical industry. The association, therefore, unqualifiedly indorsed the findings and report of the electrical industry sub-committee on bare grounded-return wiring systems.

R. A. Smith, Norfok, Va., chairman of the standardization committee, presented a preliminary report. The general plan was indorsed and the committee continued as a permanent standing body. Its report is a comprehensive outline of all the possible activities of a city electrical department, embracing fire alarm, telegraph, police signal telegraph, construction and operation and lighting and power plants.

Among the interesting papers presented at the meeting were: "Phantom Circuit Remote-Control Systems," by H. H. Reeves, General Elec-

tric Company; "Practical City Street Lighting," by Frank J. Dix, Fort Wayne, Ind.; "Renewable Types of Inclosed Fuses," by A. L. Eustice, Economy Fuse & Manufacturing Company; "Police Signaling Systems as Affecting Municipal Electricians," by E. E. Salisbury, Gamewell Fire Alarm Telegraph Company; "Buffalo's New Police Signal System," by Gustave F. C. Bauer; "The Growing Tendency Toward Surface Wiring for the Sake of Flexibility and Economy in Many Classes of Buildings," by C. W. Abbott, American Conduit Manufacturing Company, Pittsburgh; "Fire Hazards of Domestic Electrical Appliances," by W. J. Canada, Bureau of Standards, and "Common Battery Service Operating Fire Alarm Circuits," by J. B. Yeakle, Baltimore, Md.

League of California Municipalities.

The twentieth annual convention of this league will be held at Santa Rosa, Cal., September 24 to 28. The program should be of much interest to municipal officers and workers. The program follows:

Gov. Wm. D. Stephens, of California, on Tuesday morning will talk on better municipal government. In the afternoon, Max Thelen, President of the California Railroad Commission, will speak on "Grade Crossings Within Municipalities." At this session the actual accomplishments of California City Planning Commissions will be set forth in reports of officials of the California Conference on City Planning, which will hold its annual meeting at Santa Rosa during the same period.

At the session of engineers, councilmen and street superintendents on Wednesday morning, there will be talks by exhibitors, followed by addresses, including "Redding's New Lighting System," by E. A. Rolison, City Electrician, and a symposium on "The Advantage of Planting Flowers Instead of Grass in Parking Spaces."

"The Police Power and Control of

(*Continued on page 300.*)

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

A WATERWORKS SYSTEM is to be built by Port Dover, Ont. The engineers for the improvement are James, Louden & Hertzberg, Excelsior Life building, Toronto, Ont.

WATERWORKS improvements to cost $150,000 are to be made by Wooster, O. The consulting engineering work is done by J. W. Sherman Co., 513 Nasby building, Toledo, O.

A WATERWORKS SYSTEM to cost about $158,000 is to be built by Pasco, Wash. Plans for the improvement are being prepared by Sawyer Bros., White building, Seattle, Wash.

Ebensburg, Pa., is receiving bids on a reinforced CONCRETE ARCH BRIDGE. Plans and specifications were prepared by J. L. Elder, Jr., Ebensburg.

A new BRIDGE is to be built by Watertown, N. Y. Plans and specifications have been prepared by the Concrete Steel Engineering Co., Park Row building, New York, N. Y.

Stratford, Conn., is building SEWERS and a SEWAGE DISPOSAL PLANT. The engineer for the improvements is Clyde Potts, 30 Church Street, New York, N. Y.

WATERWORKS IMPROVEMENTS are to be made by Waurika, Okla. The engineers for the work are the Mackintosh-Walton Engineering Co., 1023 State National Bank building, Oklahoma City, Okla.

Hennepin and Dakota counties, Minn., plan to spend $425,000 on a BRIDGE and HIGHWAY IMPROVEMENTS. Plans and specifications are being prepared by the Tolz Engineering Co., 1410 Pioneer building, St. Paul, Minn.

A SEWER SYSTEM will be constructed by private parties in Elgin, Texas. Henry Exall Elrod, Dallas, has been retained as consulting engineer.

PAVING IMPROVEMENTS are to be made by East View, O. The engineers for the work are the F. A. Pease Engineering Co., 802 Marshall building, Cleveland, O.

Extensions and improvements to its WATERWORKS are proposed for San Bernardino, Cal., and being planned by F. C. Finkle, 448 Hellman building, Los Angeles, Cal.

A WATERWORKS SYSTEM is to be built by North McGregor, Ia. Plans and specifications were prepared by David G. Fisher & Co., 213 Whitaker building, Davenport, Ia.

A new FILTRATION PLANT is proposed by Newark, O. Plans and specifications are to be prepared by F. A. Barbour, 73 Tremont street, Boston, Mass.

Norwood, Ont., is to build a new BRIDGE. Plans and specifications for the structure were prepared by Bowman & Connor, 31 Queen Street, W. Toronto.

The village of Rice, Minn., is to construct an ELECTRIC DISTRIBUTION SYSTEM and transmission line. The consulting engineer for the improvement is Earle D. Jackson, Capital Bank Building, St. Paul, Minn.

Extensive improvements to cost $2,000,000, including a CITY PLAN development, a bridge, sewer system, sea wall and water front improvements, are proposed for St. Augustine, Fla. The American Park Builders, 140 S. Dearborn street, Chicago, Ill., are the architects for the projects.

PERSONALS

Beck, James P., general manager of the Portland Cement Association, with headquarters at 111 West Washington street, Chicago, died September 8 in Chicago. Mr. Beck was a little past 31 years of age, having been born January 27, 1886, at Odell, Ill. Mr. Beck was graduated from the University of Illinois in 1907 with the degree A.B., in L. and A. On his graduation he entered the employ of the Universal Portland Cement Co.—to be precise, in June, 1907. Two years later he was made publicity manager of that company by Edward M. Hagar, then president of the Universal Portland Cement Company. Edward M. Hagar, who originated the Cement Products Exhibition Co., while one of the cement shows was being planned, became too ill to attend to details and transferred the responsibility to Mr. Beck. His first as well as following efforts to make the Cement Products Exhibition Co. a success were noteworthy. Mr. Beck was also a prime mover in the two national conferences which were held in Chicago, known as the National Conference on Concrete Road Building. During the fall of 1915 Mr. Beck was chosen to formulate plans for broadening the scope of work of the Association of American Portland Cement Manufacturers, the headquarters of which were then in Philadelphia. After several months' work Mr. Beck submitted at the annual meeting of the association in December, 1915, a very comprehensive plan which was adopted essentialy in its entirety. Mr. Beck was then made general manager of the association to put into effect and carry out the plan which he formulated. He was a member of many clubs, associations and fraternities, among which were the following: Advertising Association of Chicago, Cement Products Exhibition Co., American Concrete Institute and American Society for Testing Materials.

Bowers, George W., assistant engineer of construction of the Cleveland water works, has obtained leave of absence to act as engineer in charge of water supply works under R. Winthrop Pratt. Mr. Pratt is consulting engineer for the government at Camp Sherman, Chillicothe, Ohio.

Brensinger, George F., city commissioner of Jersey City, vice-mayor and head of the department of revenue and finance, was killed in an automobile accident, Sept. 11.

Smith, E. J., for the past eighteen months in charge of highway work in Meigs county, Tenn., has been placed in charge of highway work in Fentress and Morgan counties.

Thomas, Prof. Robert G., has been appointed a member of the South Carolina Highway Commission.

Whitney, R. E., formerly with Weston & Sampson, has been appointed to a first lieutenant.

NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

TAPPING MACHINES

"Pressure" and "Dry" Outfits of Improved Design

The Lennox improved pressure tapping machine is designed for tapping water, gas and other mains under pressure, the cocks and plugs being inserted without lessening or removing the pressure in the pipes. After the machine is fastened on the main no disconnecting or changing is necessary until the work is completed. The tap is made and the cock placed in position without the necessity of taking any portion of the machine apart.

An even more difficult job may be easily performed with this machine. A small cock can be taken out, the size of the hole increased, and a larger cock inserted by screwing in the plug while the change is made.

The machine is provided with gear and pinion, thus permitting it to be readily turned to place under the heaviest pressure. It has no extra parts for high pressure, but is so arranged that there is no waste of water, the gasket between the saddle and the machine making it water-tight. A very valuable feature is the screw plug for holding corporation cock, which is so constructed that it is impossible for the cock to drop off.

A tapping machine is constantly transported from one piece of work to another, and must, therefore, be of light construction but sufficient strength to withstand heavy pressure. This machine is claimed to combine both requisites without sacrificing the essential demands in either case.

Durability is the outstanding feature of the design, and as the machine is composed of very few parts the necessity of repairs is much reduced. Any size pipe, from two inches to thirty inches can be tapped, and the machine will operate on the mains in any position, top, bottom or sides.

In the "Special" dry tapping machine are particularly featured simple construction and design, easy operation and durability. This machine has a double standard, with sliding cross-head or yoke supporting the tap. All parts are thus subjected to equal pressure and the tap being centrally located the possibility of its springing out of line, which is a frequent occurrence with machines clamped on one side, is prevented. The dimensions and design of the dry tapping machine have been adapted to the standard taps; these are the same as are used in the pressure tapping machine, rendering the taps interchangeable and thereby saving the expense of supplying different taps for each machine.

In operation, over the point where tap is to be made are assembled the large rubber gasket, saddle, small rubber gasket and body of machine. The chain is arranged for holding in place and the nuts drawn tight to prevent leaks. The combined drill and tap, safety plug and screw plug with corporation cock are inserted into the stuffing boxes of the three outer holes in cap or upper portion of machine. The large leather gasket is fitted into the machined groove in cap and put cap in place. The pinion is placed in mesh with teeth of cap. The yoke is assembled with feed screw in place. The cap is rotated until combined drill and tap is over point where tap is to be made, when index pin will engage slot in cap. The cap is secured to body by stud-nut screwed on to stud at center of cap, placing flat leather washer between stud-nut and cap.

The wrench is put in position on drill and tap, the yoke raised, feed screw set down; it being noted how far to feed to get sufficient thread for corporation cock. After hole has been drilled and tapped the feed screw is loosened to release its point from center of tool, the yoke swung and tool raised to clear hole. The cap is rotated until safety plug or corporation cock, as desired, automatically indexes over tapped hole and screwed in to complete tap. The machine is released by simply loosening chain.

The accompanying illustration shows the pressure tapping machine. It is made by the Lennox Machine Company, 2558 W. 16th street, Chicago, Ill., and Marshalltown, Ia.

"RAPID" CAR LOADER

For the Economical Handling of Construction Materials

The shovel method of unloading construction materials from railroad cars to wagons and trucks is rapidly giving away to mechanical methods because of the slowness and expensiveness of the more primitive way. The Rapid loader is designed to overcome contractor's difficulties with scarce and expensive labor. It is built for rapid and economical handling of sand, gravel, crushed stone, coal, cinders, cement or other materials from railroad cars, gravel pits, cinder piles and coal yards.

The loader is designed that it tips easily and returns to position automatically by gravity. It can be so placed that it will clear any standard vehicle when it is used to load wagons from railroad cars. It is in two parts and is light enough so that two men can handle it easily. It is claimed to be so economical of operation that it requires the handling of only about 300 cubic yards of crushed stone or gravel out of railroad cars to pay for one loader by the saving which it can make in this time over the old methods of holding the team while shoveling into the wagon.

There is also a saving in material, which is frequently wasted in the shoveling method by being spilt by badly aimed shovel loads. There is also no time wasted by the men in looking over the car side to see if they are pitching into the wagon.

The device is made entirely of steel and is claimed to be practically indestructible—but as light as is consistent with proper strength and durability. The two parts in which it is made are separable, and the device is easily and quickly put into place or taken down. There are no hinges, latches or doors to get bent and out of shape. The outfit is built in three styles: one,

THREE VIEWS OF "RAPID" CAR UNLOADER AT WORK.

one and one quarter and one and one half yard capacities.

The accompanying illustrations show the Rapid loader in action. It is a product of the Bonney Supply Company, Inc., 371 St. Paul street, Rochester, N. Y., which also makes the Rapid sand and gravel washer.

INDUSTRIAL NEWS

Cast-Iron Pipe.—Prices still remain at their high level of the last few weeks. The general inactivity in orders and construction continues. Quotations: Chicago, 4 inch Class B and heavier, $68.50; 6-inch, $65.50. New York, 4-inch, class B and heavier, $68.50; 6-inch, $65.50. Birmingham, 4-inch, Class B and heavier, $63; 6-inch, $60; class A, $1 extra.

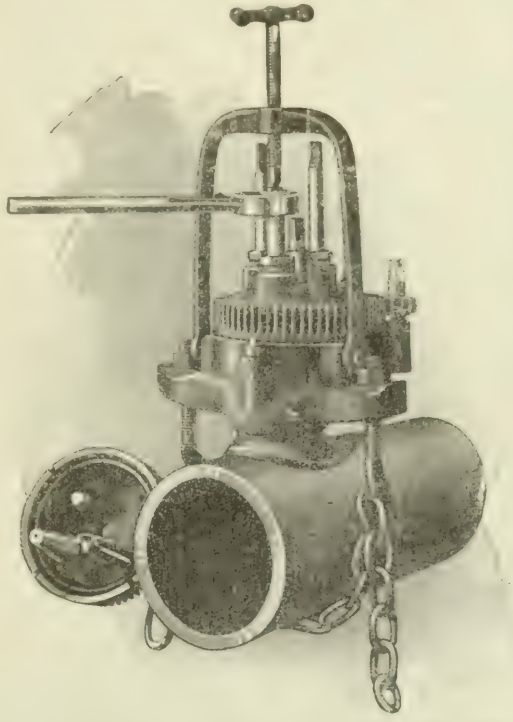
The Asbestos Protected Metal Company, Pittsburgh, Pa., announces the opening of a sales office in the Union Central Building, Cincinnati, under the direction of Mr. J. C. Lathrop.

The Wyckoff Pipe and Creosoting Co., Inc., 30 East 42nd street, New York, N. Y., announces that it has furnished over a million feet of conduit to the Bell Telephone Companies this year, for placing their wires underground in many localities throughout the United States. It is stated that an examination of the lines that have been put in for the different companies show no signs of decay after having been underground for over thirty years.

The Thompson Electric Company, 5606 Euclid Avenue, Cleveland, Ohio, is distributing a new bulletin, supplementary to catalogue B-16, describing its safety disconnecting hanger.

The Michigan Water Pipe Company, Bay City, Mich., has published a very neatly and interestingly prepared catalog describing and illustrating its "Michigan" combination steel and wood water pipe. The manufacture of the pipe is clearly described and the uses enumerated in detail. The lasting qualities of wood pipe are emphasized. Seventeen reasons for the use of this wood pipe are given, as follows: 1—Durability, 2—Sanitation, 3—20 per cent more capacity, 4—Simplicity in handling, 5—Light in weight, 6—Speed in laying, 7—Protects against freezing, 8—Not affected by electrolysis, 9—Rigid inspection of materials, 10—Efficient construction of stave, 11—Strength for steel banding, 12—Protection of banding, with asphaltum, 13—Cannot burst under extreme pressure, 14—Can be laid in a wet trench, 15—Short curves without specials, 16—Low installation and maintenance cost, 17—Responsibility of company. The service of wood pipe in municipal water supply systems and in hydro-electric plants is shown in a number of examples. Valuable technical data on wood pipe and on steam heating are a feature of the catalog. On the whole, this book should prove a useful and interesting addition to the library of contractors, engineers, waterworks men and others interested in the field.

The American-La France Fire Engine Co., Inc., Elmira, N. Y., announces the shipment of the following orders: Bridgeport, Conn., type 14 combination city service truck—San Gabriel, Cal., type 12 combination with junior pump—Syracuse, N. Y., triple combination piston pumper and hose car—Stockton, Cal., type 12 combination chemical engine, a hose car—Steelton, Pa., two type 12 combinations with junior pumps—Scarsdale, N. Y., type 14 combination service truck—Scarsdale, N. Y., type 10 triple combination chemical engine and hose car—West Park, Ohio, type 12 triple combination chemical engine and hose car—Albany, N. Y., Brockway combination—Watch Hill, R. I., type 75 triple—Philadelphia, Pa., type 10 salvage corps car—Rome, N. Y., type 10 chassis—Atlantic Highlands, N. J., type 40 combination with junior pump—



LENNOX PRESSURE TAPPING MACHINE.

Baltimore, Md., type 12 triple—Long Branch, N. J., type 12 chemical engine with junior pump—Coal Township, Pa., type 12 combination pumping engine and hose car—Huntington, Pa., type 12 triple—LaCrosse, Wis., type 14 city service truck—Syracuse, N. Y., type 12 combination chemical engine and hose car—Groton, Conn., triple combination chemical engine and hose car—Charles City, Ia., type 40 combination with junior pump—Kane, Pa., type 40 triple combination chemical engine and hose car—Irwin, Pa., type 12 combination with 500 gal. pump—St. Clair, Pa., Brockway type D combination—Wrightstown, N. J., 3 type 76-b pumping engines and hose cars—Steelton, Pa., type 14 combination service truck—Lockport, N. Y., Brockway type D chassis—Salem, Mass., type 40 combination with junior pump.

The Portland Cement Association, 111 West Washington street, Chicago, Ill., announces that H. E. Hilts, formerly district engineer at San Francisco for the association, has been elected by the board of directors to succeed the late Mr. J. P. Berk as general manager. Mr. Hilts was born in New York and obtained his technical and engineering education at the University of Pennsylvania. His first work was as rodman with the Mexican International Railroad. Later he was in the employ of the Philadelphia and Western Railroad. For two years he was instructor in the engineering department of the University of Pennsylvania, after which he entered the service of the New York Central Railroad, leaving that company to become associated with the Portland Cement Association as road engineer in 1913, for territory comprising the New England and Northeastern States, having been stationed at Albany and Easton, Pennsylvania. In 1915 he was appointed district engineer at San Francisco. Mr. Hilts is an associate member of the American Society of Civil Engineers, member of American Society for Testing Materials, associate member of the American Railway Engineering Association and also a member of the American Concrete Institute.

The Goodyear Tire and Rubber Company, Akron, O., has recently been kept busy answering the many queries that have come from all parts of the country as to the success of the Akron-Boston motor transportation line established several months ago, by the addition of three trucks to the pioneer Packard which has been operating on a regular seven-day schedule since last April, thus forming a fleet of four. Although probably the pioneer truck in a new transportation era, the big five-ton Packard, which has been hauling tires to the company's eastern branches, returning laden with tire fabric from the Goodyear Cotton Mills at Goodyear, Conn., has already become a commonplace, and a fixture, along the Lincoln Highway and Boston Post Road. At first there was a disposition to regard the innovation as a publicity measure, but the steady plugging of the big Packard truck along the route on a regular schedule soon convinced all the doubting ones that the new project was not a tire advertising venture, but a commercial transportation enterprise. The fleet consists of two Whites and two Packards. Although speeds of 20 miles per hour may be attained with the three-ton trucks and 30 miles with the five-ton machines, the schedule is based on an average of 10 miles per hour, including stops for meals, motor supplies, etc. The big cord tires used on these trucks are claimed to have opened up a new field for transportation lines. Many trucks

that have been plugging away on solid tires at slow speeds may now double their speed on pneumatics, with both tire wear and gasoline consumption materially reduced, according to the Goodyear accounts.

NEWS OF THE SOCIETIES

(Continued from page 297.)

Streets by the Governing Bodies of Municipalities of This State," "Some Interesting Problems Confronting a New Municipality," and "Establishment of Grades in Street Improvement Work" will be handled respectively by City Attorneys W. P. Butcher, of Santa Barbara; John J. Mazza, of Corte Madera, and D. J. Hall, of Richmond, on Wednesday morning, at the session of the department of city attorneys. A number of other interesting topics will be heard during the morning, including a symposium—"Keeping the Records Under the '1915 Bond Act.'"

Thursday's sessions will include the following: "How Santa Rosa Did Its Own Street Paving," D. W. Cozad, street commissioner of Santa Rosa; "Wasting Money on Street Pavements," D. W. Perry, city councilman of San Anselmo; "Experience of the Highway Commission with Different Types of Pavement"; "The Comparative Cost of Oil Macadam with Pavement Having a Cement Concrete Base"; "Liability of a City for Trees and Other Obstruction in Streets," city attorneys of Palo Alto and Alameda; "Disposition of Fines Under the Motor Vehicle Act"; "The Limit of the Discretion Allowable to the Superintendent of Streets in Specifications for Street Improvement Under the Improvement Acts," Geo. A. Work, city attorney of Rio Vista; "The Policy of Using Sign Posts or Iron Buttons at Street Intersections," a symposium, and "How the League May Increase Its Benefits to Municipalities," a symposium.

The convention will be brought to a close on Friday by the election of officers, selection of next meeting place, and other business. There will be a barbecue aat Asti Friday afternoon, after an automobile trip.

New Jersey State Firemen's Association

War relief measures in the cases of firemen's families who may be affected by military service will be discussed September 21 at the annual convention of the New Jersey State Firemen's Association to be held at Atlantic City. Liberality will be urged by the executive committee, Bird W. Spencer, president, which will state in its annual report:

"Our funds cannot be used in a better cause than to encourage the display of bravery in the defense of our country and the institutions of civilization, liberty and democracy to which it and we stand pledged, and that should there be any question of the right to grant the relief sought, to at once ask the advice of our counsel, who will resolve every doubt in favor of giving relief."

Another recommendation of the committee will be the voting of the association's complete support of the administration in its war policy.

Of particular interest to the delegates will be the report of the legislative committee, which will bring up questions of membership competency and the administration of funds of the benefit bodies making up the association. These now number 306, a gain over last year of six. Of the funds in the hands of the commissioner of banking and insurance, it is reported, $20,000 was paid for the support and use of the Firemen's Home at Boonton and $230.24 to each relief association. This is the largest distribution in the association's history.

National Highway Association, Piedmont Division.

One hundred good roads advocates from North Carolina and Virginia met at Lynchburg, Va., August 27, and formed the Piedmont division of the Bankhead National Highway association, which proposes to improve the Sand Hill section of the route between Atlanta and Lynchburg. The officers are:

W. R. Lynch, Fieldale, Va., president; D. B. Ryland, Lynchburg, Va., vice-president. Executive committee—L. T. Hartsell, Concord, N. C.; R. L. Dibrell, Danville, Va.; R. P. Richardson, Reidsville, N. C.; W. H. Burton, Spencer, N. C.; Zeb Vance Walser, Lexington, N. C.; N. H. Woodson, Salisbury, N. C.; Walter Fauntleroy, Alta Vista, Va.; Colonel Panell Rucker, Martinsville, Va.; Dr. Wm. Tunstall, Lovingston, Va.; C. M. Van Story, Greensboro, N. C.; O. L. McCraw, Lynchburg, Va.; A. E. Strode, Amherst, Va.

The Municipal Engineers of the City of New York

At the meeting in the Engineering Societies' Building at 8:15 P. M., on Wednesday, September 26, 1917, a paper entitled "Reconstruction and Diversion of Sewers on Account of New York Subways" will be presented by Samuel D. Bleich, Assistant Division Engineer, Public Service Commission. A discussion of this paper will also be presented by Joseph L. Hunt, Assistant Division Engineer, Public Service Commission. Both paper and discussion will be illustrated by lantern slides.

Trans-Allegheny Good Roads Association

At the annual meeting held at White Sulphur Springs, W. Va., Sept. 9, the convention re-elected all the old officers, as follows: George W. Stevens, Richmond, president; W. A. MacCorkle, Charleston, vice president; A. S. Johnston, Union, secretary, and Decatur Axtel, Richmond, treasurer.

Addresses on good roads were made by former Gov. William A. MacCorkle, President George W. Stevens of the Chesapeake & Ohio Railroad, and others. Reports were received from the following counties: T. S. Scanlon, for Cabell; J. T. Garrett, for Pitman; M. P. Malcolm, for Kanawha; Leslie Bayliss, for Fayette; E. D. Williams, for Summers; J. W. Johnson, for Monroe; S. W. Hinkle, J. S. McWhorter, E. D. Smoot and John C. Dice, for Greenbrier; J. T. McGinniss and C. L. Scott, for Raleigh.

From these reports it was shown that of the 70 miles of Midland Trail between the Virginia and Kentucky state lines, 113 are already constructed. Committees will be named later in each district to forward the work of building the connecting links.

Providence Engineering Society

The meeting on "Municipal Engineering" of the society will be held 8:00 P. M., Sept. 26. Dr. Francis A. Carmelia of the United States Public Health Service will address the section in the Society rooms at 8:00 P. M., on "Sanitary Conditions of Narragansett Bay."

The paper will be discussed by Stephen DeM. Gage, Chemist and Sanitary Engineer of the State Board of Health, and by C. N. Harrub, Sanitary Engineer of the United States Public Health Service.

New York State Civil Service, October 6, 1917.

Open competitive examinations for the following positions in the state service will be held throughout the state on the date mentioned above. Candidates should apply to the "State Civil Service Commission, Albany, N. Y.," for the proper application forms. No application forms will be sent out by mail after September 24, and none returned will be accepted if received at the office of the commission after September 26.

251. INSPECTOR, State Department of Health. $1,260. Men only. Two registers will be established; the first will be a list of those qualified in general sanitary and milk inspection, and the second, a list of those qualified in building construction of county tuberculosis hospitals. The department desires to appoint one sanitary milk inspector and two building construction inspectors, and applicants for the latter position should be qualified to inspect the construction of county tuberculosis hospitals, to read architects' blue prints and specifications, and to check up the construction with the drawings and specifications. Subjects of examination and relative weights: Questions pertaining to the duties of the position, 2; education, experience and personal qualifications, 3. Candidates may be summoned for an interview with the examiners.

255. CHIEF OF DIVISION, Bureau of Statistics and Accounts, Public Service Commission for the First District. $3,001 to $5,000 a year. Open to men only. The duties of the position require familiarity with the economic principles applicable to the determination of rates and charges, the classification of accounts and the supervision of security issues of public utility companies. Candidates must therefore submit evidence of the possession of a thorough knowledge of corporate finance, accounting theory and practice (with special reference to the system of accounts prescribed by the Public Service Commission), and statistical theory and method; also evidence of ability to supervise the work of statisticians and accountants in a comprehensive investigation of corporate accounting and finances. Candidates will not be required to appear at any place for examination, but will be rated on their training, professional and personal records and submitted papers, including published writings. They may also be summoned for an interview with the examiners.

257. ASSISTANT CONSTRUCTION ENGINEER, Commission on New Prisons. $1,800 to $3,000. Twelve years' experience in construction of buildings and engineering works required. One appointment at maximum salary and others at lower salaries expected. Persons desiring to take this examination should write to the commission for special circular of information.

Municipal Journal

Volume XLIII NEW YORK, SEPTEMBER 27, 1917 No. 13

APPLIANCES IN WATERBOUND MACADAM CONSTRUCTION

Gravel Loaded by Steam Shovel Directly from Bank Into Trucks—Steam Shovel Used for all Grading More Than Six Inches Deep—Screening and Loading Gravel with One Handling.

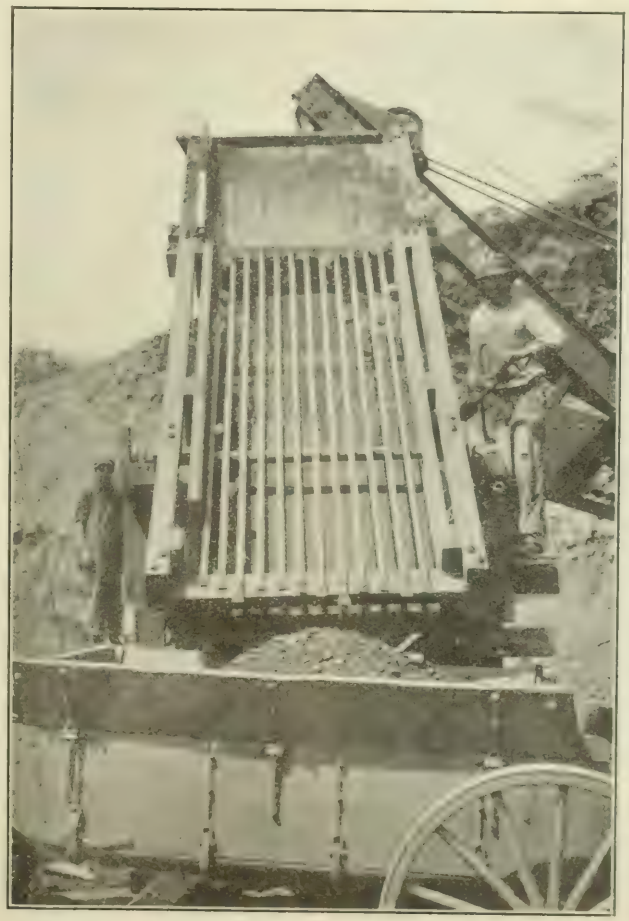
Because men are so hard to get, Fred E. Ellis of Melrose, Mass., who has the contract for constructing about 5½ miles of waterbound macadam between Castleton and Brookview, Albany Co., New York, is obliged to rely, to a large extent, on machinery and special devices to replace the men. Not more than 20 men have been on the job at any one time and the average number of laborers is usually about half of this, but the work is progressing favorably, except in grading, where the lack of men is most apparent. However, several miles have been partly graded and now the men employed are putting down the top course. With two rollers and all the men, 1,000 feet a day has been completed.

The job is principally resurfacing on an old gravel and earth road. The procedure is to lay gravel shoulders and banks to retain the stone when spread, deposit the stone on top of the old road and compact according to the department specifications for waterbound macadam. No scarifying, except a light treatment with the road grader, was given the old road.

Stone for the road was furnished by the New York Trap Rock Co., which took the contract to deliver the stone on the job. It was shipped by barge up the Hudson river to Castleton, where it was unloaded by clam shell buckets into a bin. From this bin it was loaded by gravity into motor trucks and hauled to the job. The Watson Contracting Co. did this part of the work and furnished a fleet of six 5-ton Pierce-Arrow motor trucks. These were loaded to capacity and hauled all the stone, the average haul being about 3 miles. The roads, being of dirt and gravel, were not adapted to such heavy traffic and were rapidly cut up. Nevertheless the trucks averaged 83 miles a day fully loaded, or about 210 ton-miles on stone hauling, in addition to hauling gravel on return trips. The trucks were equipped with a tail-board for spreading stone and were able to deliver the stone at about the required depth, though usually some redistributing by hand was necessary.

About 3 miles from Castleton was found a good gravel bed. This gravel was used as material for several fills along the road and as shoulders and side retainers for the macadamized section of the road. A Thew shovel, Type O, equipped with a ¾-yard dipper, handled all the gravel, loading it directly into the motor trucks. These carried, on their return trip from hauling stone, gravel for fills and for shoulders, dumping it along the road, to be redistributed by hand. This extra work delayed the trucks but little and saved a great deal of teaming.

At times the trucks were not available for hauling gravel, which was then done by teams and by a traction engine train composed of a Buffalo Pitts traction engine and a train of two or four Buffalo Pitts 6-yard bottom-dump trailers.



FRONT VIEW OF SCREEN TIPPED FOR DUMPING.

The Thew shovel, in addition to use at the gravel bank, was used on all cuts over 6 inches in depth. Mr. Ellis believes it is more economical on a cut of this sort to use the shovel even in case slightly too much is taken out and must be replaced by hand, than it is to do the excavating by hand.

On one section of the road a gravel sub-base was necessary. This required a rather coarser gravel and made it necessary to screen the gravel from the pit. In order to perform this screening and to obviate the necessity of handling the gravel twice, Mr. Ellis evolved a tipping screen that could be worked by the shovel with small loss of time and would require only one handling of material.

Unless he should purchase a new boom for his Thew shovel, the gravel could be raised and deposited not more than 10 feet. He therefore constructed a screen hinged

TRACTOR HAULING TWO SIX-YARD TRAILERS

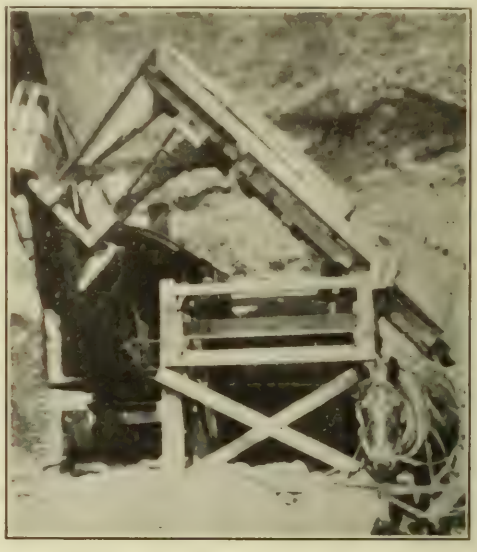
at one end, 10 feet high, on which the shovel deposited the gravel. The dipper was then lowered, caught onto the screen near the bottom and raised, allowing the coarser gravel to slide over the screen and into the truck, the fine material falling through the screen. This fine material was shoveled to one side by two men and placed within reach of the shovel. At intervals it was loaded into wagons and carted away for filling.

The screen was 10 feet long and 4 feet wide, built in two parts. An upper screen was composed of half-inch water pipe, 10 feet long, the pipes being about 3 inches apart. This was to break up the clods and prevent the larger stones from injuring the lower screen, placed a foot underneath. This lower screen was Clinton wire cloth with a mesh about ½ inch by 6 inches. At one end was built a board platform on which the shovel dumped. Under the other end stood the truck to be loaded.

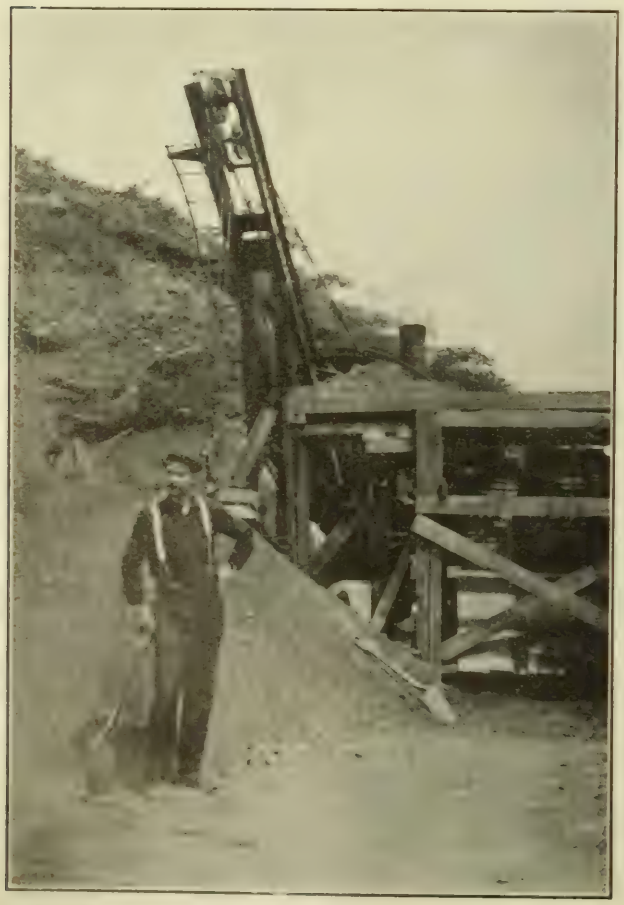
The screen proper was supported at one end by a standard of 2 x 4's built under the platform, and at a point about 2 feet from the other end by a piece of shafting fastened to the screen frame, which was made of 2 x 6 timbers, with a U-bolt, and supported on a frame of 2 x 4's mounted on skids. The top of the pipe part of the screen was 10 feet above ground level.

At the bottom of the standard under the platform was fastened a short section of chain. The shovel dumped a dipperful on the platform, lowered the dipper to the chain, which was fastened to a tooth of the dipper, and raised the platform end of the screen about ten feet in the air. This revolved the screen about the shafting, bringing it to an angle of 45 degrees and allowing the gravel retained by the screen to slide into the truck. In this way the gravel could be screened with little delay and at a very low cost.

The method of laying the macadam is practically the same as that usually followed. Two Buffalo Pitts rollers are used on this work. Other equipment includes an Acme road grader, which is used in grading the road just before placing the stone. The shoulders are gone over by hand and the stone is usually placed by forks after being dumped by motor trucks. Cast iron pipes are used for culverts.



SIDE VIEW OF SCREEN LIFTED FOR DUMPING GRAVEL INTO WAGON.



SIDE VIEW OF SCREEN; STEAM SHOVEL PLACING GRAVEL ON IT.

SAFER GRADE CROSSINGS.*

Bad railway crossings cause many serious and fatal accidents. Constructing the road with a decided rise or fall just at the track contributes largely to the danger for automobiles at such crossings; but this construction is common where the railroad is above the normal level of the highway. To eliminate all grade crossings is out of the question; therefore, efforts to decrease loss of life must be directed largely toward making necessary grade crossings reasonably safe. A level stretch of road at each side of the track is necessary for safety.

Attempts are often made to get over bad crossings on "high." The steep ascent, combined with the necessity of slow speed over the rails to avoid jolting may cause the driver to "kill" his engine just as he reaches the rails. With the rear wheels perhaps still on the grade, there is no chance for momentum to carry the car over. A fast train bears down upon it—the crash is inevitable. Another accident is added to the long list.

The remedy is simple. A level stretch of road provided on each side of the track and an unobstructed view will result in saving many lives. Instead of the crest at the track there must be substituted a level section, even though steeper approaches are necessary. In most instances a satisfactory profile can be obtained at a moderate cost.

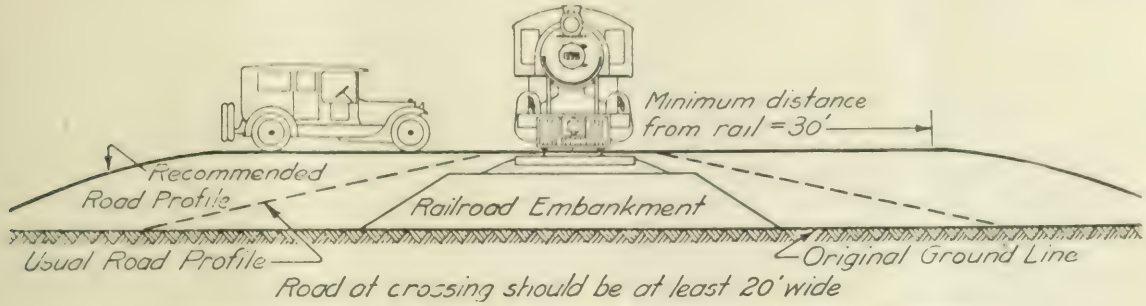
The level stretch should begin at least 30 feet in front of the first rail. Since a railroad right of way is usually

*An article in "Concrete Highway Magazine," by George S. Eaton.

100 feet wide, the improvement might well extend for this distance. Where the railroad fill is high enough to hide machines approaching from the opposite side, it is imperative that conditions be improved, for here there is additional danger of two automobiles colliding. Road engineers are recommending a minimum sight distance of 300 feet at every point along the road. Especially is this desirable at a grade crossing, and a level section here will aid in fulfilling this requirement.

Sufficient width should be provided for two automobiles to pass without slowing down for that purpose—20 feet at least. Then, if the crossing itself is made as even as possible, there will be no congestion at this most dangerous place.

The increased safety from such improvements is more than worth the cost, even though considerable. Crossings must be such that if an automobile is to stall it shall be somewhere other than in front of a train. Cooperation between county or township authorities and the railroads, working under the State Railroad Commissions, where they exist, will do much to make for safety. Continued neglect means more accidents.



RECOMMENDED AND USUAL ROAD PROFILES AT RAILROAD CROSSING.

TRAFFIC REGULATION AT RIGHT-HAND TURNS.

Editor, Municipal Journal, 243 West 39th St., City.

Dear Sir:

I am sending you herewith a scheme for the regulation of traffic at the intersection of streets or avenues where the vehicular as well as the pedestrian travel is heavy. I thought this might possibly be of interest to your readers.

The idea was evolved as particularly adapted to the intersection of congested thoroughfares such as 5th Avenue and 42nd Street, New York City. The scheme may be summarized as follows:

At the intersection of the curb line a barrier is placed extending a distance back from the intersection at each side sufficient to prohibit pedestrian traffic from crossing the street on the same line as the pavement. This is shown in the diagram by the heavy lines. This barrier may be either of ornamental iron work or of some material to make it ornamental in its effect. It should preferably extend a distance of, say, 20 to 25 feet from the intersection of the curbs. The safety zone for pedestrians is placed on the lines from the ends of this barrier, as shown by the dotted lines across the street. The object of the barrier and the placing of the safety zone in a position as noted on the diagram may be described as follows:

Diagram No. 1 shows the line of traffic moving north and south as per the signal of the traffic officer, noted by the dot in the square near the tracks. The pedestrian traffic is then moving across the safety zone as shown. In case a vehicle moving north or south wishes to make the right hand turn, it does so and assumes a position alongside of the barrier and stops at the line of the safety zone for pedestrians. In this way the vehicle is out of the line of traffic going north or south and does not need to go through the flow of pedestrian traffic in order to get out of the way. The vehicle occupies a position as shown by the arrows, until the signal is given by the traffic officer for north and south traffic to stop and east and west to go. This allows the vehicle to proceed after the pedestrians have ceased to cross the zone. All vehicular traffic stops in front of a pedestrian safety zone as shown by the diagram.

On Diagram No. 2 is shown the possibility of a vehicle making a left-hand turn and assuming a position alongside of the barrier, without going through the flow of pedestrians crossing the street. This diagram also shows how a vehicle is caught near the intersection of the centers of the street when the signal to stop has been given by the traffic officer to vehicles moving in the direction in which it is going. It may stop alongside of the barrier and in front of the pedestrian safety zone without interfering with the flow of traffic across the street. This is shown by a dotted arrow assuming the position in the north barrier.

Incidentally the barrier also has the function of making people realize, by deflecting them out of their course, that they are making a dangerous crossing.

It is believed that such a scheme, installed at the intersection of avenues having pedestrian as well as vehicular traffic, will be a means of better regulation, quicker service and lessening of the possibility of accidents to pedestrians and vehicles.

Hoping that this will prove of interest, I remain

A PEARSON HOOVER.

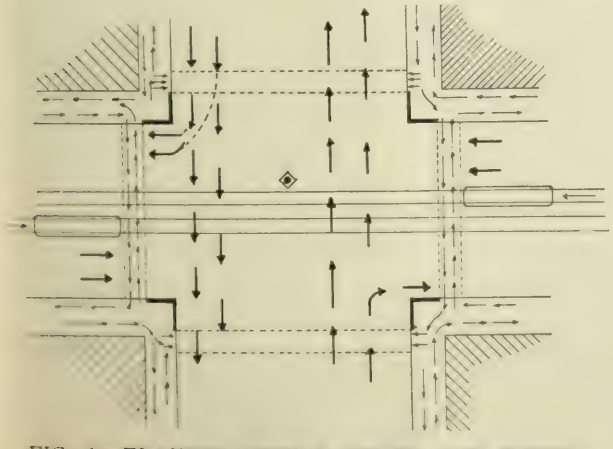


FIG. 1.—TRAFFIC MOVING NORTH AND SOUTH.

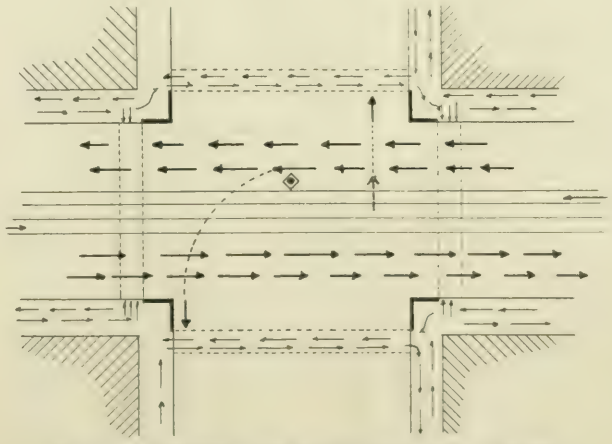


FIG. 2.—TRAFFIC MOVING EAST AND WEST.

BABY CARRIAGES AND STREET CROSSINGS.

By CHAS. M. BELL.

In the design of sidewalks and curbs at street intersections, engineers have seldom given much thought to facilities for getting baby-carriages and go-carts from the sidewalk to the pavement level, or vice versa. In some instances this is taken care of by bridging the gutter with an iron plate with a small rise in the pavement at this point. In other cases where the topography permits the catch-basin to be placed above the cross walk and no gutter is necessary, the cross walk and pavement can be made to come together in elevation at the curb. But in the majority of cases there is an abrupt drop of six inches or even more, necessitating a step up or down as the case may be.

The city in which the writer resides is even worse. The pavements have been in place for a number of years and evidently were not built for permanence. As a result, probably due to frost action, the curb stones have risen from one to two inches. This makes it necessary not merely to push the carriage off the curb but actually to lift it over the curb. A man or even a strong woman can do this easily, but on many women, not so healthy, who are compelled by circumstances to wheel their babies, it causes quite a strain. Many tired mothers have walked half a block in the middle of the street to take advantage of a driveway to return to the sidewalk.

If neither of the above mentioned remedies is practicable, there are other plans which are comparatively inexpensive and yet not undesirable. A break could be made in the curb the width of the sidewalk and the latter sloped from the gutter back and up to its proper elevation, making the slope several feet long if necessary. If this plan is not suitable, a special place could be made for baby-carriages. In many instances this could be situated on the curve of the curb between the intersecting walk unless prevented by the catch-basin. In other cases it could be made adjoining the walk and on the side away from the intersection. A break in the curb 30 inches long with a slope up from the gutter of about two to one, the whole constructed of concrete, would be ample.

It is certain that such an improvement would be greatly appreciated by the feminine population of the cities and in a great many cases by the other half as well.

The benefits derived need not be confined to baby-cabs. The device would also be used by the small boy with his wagon or velocipede, by the bicyclist and also by an occasional workman with his wheelbarrow.

SAN DIEGO PURCHASING BUREAU.

Early in the year 1916 the proposition of appending the Purchasing Bureau to the Operating Department was taken up by the council of San Diego, Cal., and the manager was asked to submit an estimate of the amount that could be saved by this further consolidation. His report estimated that a saving of $64,466.11 could be made by taking over the Purchasing Bureau the first of May, and it was agreed that this be done. Notwithstanding the fact that a delay of one month was experienced in making the change, this sum was saved, but in seven months instead of eight, as estimated.

During that time an up to date store room, in which is kept a stock of standard material, was built. By anticipating a rise in the market, a very considerable saving has been made in such staple articles as pipe, meters, hay, grain, etc., and a still further saving by buying in quantities. This bureau has a working capital of $20,000, and must, at the end of the year, show that much cash or its equivalent in stock, the stores being issued to the various departments on their requisition and at cost prices.

Fourteen automobiles were in use by the Operating Department of the city during the year, one Locomobile, one Kissel Kar, one Federal truck (in use five months), and eleven Ford cars. These cars covered a total mileage of 183,353, at an average cost of $.0523 per mile, averaging 14 miles per gallon of gas and distillate. The average cost per car for maintenance and operation, including all repairs, accessories and gas, was $47.80 per month.

HARTFORD WATERWORKS

History of Works—Details of Recent Improvements—Instrument Work at Reservoirs—Spillway Details—Grouting Seams in Foundation Rock.

Papers were presented at the Thursday morning session, September 13, of the convention of the New England Water Works Association by members of the engineering staff of the Hartford water works system, describing the past and present systems and features in the design and construction of various parts of the new supply.

The paper describing the past and present supplies was presented by W. E. Johnson, division engineer. Hartford, prior to 1855, secured most of its water from wells, but about this time constructed a small reservoir within the city limits and pumped water to it from the Connecticut river. Ten years later a gravity supply was obtained from a low range of mountains 6 miles west of the city, and this supply, secured by damming a small stream, with some water from the river, was adequate until 1873. At this time and afterwards, as was needed, additions to the mountain supply were made in quantities sufficient to stave off any immediate shortages.

By conserving the water and developing the West Hartford watershed, the amount of water was sufficient, though in 1899 raw water had to be pumped from the Connecticut river. Following this year of water scarcity, a general campaign of waste prevention was entered upon, so that there was no recurrence of the troubles of 1899.

In 1903 plans were considered for improving and enlarging the water supply, and several engineers were called in for consultation. The watershed of the West Hartford supply afforded little opportunity for increasing the amount of water, and several schemes for developing other sources were brought forward. In 1911 the Nepaug scheme was adopted by the board.

Following this, Frank Brainard described the distribution system. Some years ago a considerable amount of cement-lined pipe from 6 to 8 inches in diameter was used, but this did not prove entirely satisfactory, and in 1885 it was decided to replace all such pipe with cast iron, and only a small amount of the cement-lined pipe is now left. In 1899 it was decided to meter services, and work upon this has been continued. Among other meters, 12 detectometers have been installed. By metering, the consumption has been reduced from 85 gallons to 65 gallons per capita per day.

A number of factories have their own fire supply, drawing polluted water from adjoining streams, and are also connected with the city service. The department realizes the possibility of pollution of the city supply and has placed double check valves on the services to all such factories. Each of these check valves is inspected every month and once a year is taken apart and examined and cleaned and returned to place.

The distribution system in the business section of the

city has been so designed as to permit the supply of 10,000 gallons a minute to any block.

The meters are inspected regularly and then, as well as before first installation, must register not less than 98 per cent. of the entire amount passed and not more than 100 per cent. before they are used. In response to a question, Mr. Brainard stated that there is a master meter which meters all of the supply coming from the reservoir to the city and that 85 per cent. of the water passing through this meter is accounted for.

H. W. Horne then described the engineering work in connection with the new supply, especially that at the reservoirs. He went into the details of the new methods of laying out center lines for the dams and embankments and giving points on the slopes from time to time as the dams were raised. The masonry dam was built with its center line forming the arc of a circle, while its downstream face also was curved, and this combination of horizontal and vertical curves made the giving of points for construction quite complicated. A tower was erected at the center of the circular arc forming the center line of the dam, on which tower an instrument was placed from which were given the lines of the radial joints in the concrete. Two other points, one at each end of the dam, were solidly set, and these three points established a triangle to which all measurements of the dam were referred.

Features in the designing of the spillway of the Richard's Corner dam were described by R. E. Wise. The greatest care was taken in determining the amount of run-off for which this spillway should be designed, since the dam was of earth and any overtopping of it would be fatal. Previous records of run-off in the stream being dammed and also in other streams in the eastern part of the United States were carefully studied, and it was finally decided to design a spillway calculated to pass 165 gallons per minute for each square mile of the watershed. The spillway is built at right angles to the line of the dam and at one end of the dam, being of masonry founded upon bedrock and discharging into a channel in such rock, which channel is carried down the side of the hill to a point below the dam and discharges into the stream bed several hundred feet below the embankment.

Following this, the methods employed in constructing of cyclopean masonry the Nepaug dam was described by Mr. Griswold. The rock on which this dam was placed was pitched at such an angle as to give a smooth slope to a large part of the bottom of the foundation trench, but a rough, jagged surface to the remainder of it. Care was taken to remove all rock down to solid bedrock and to have this thoroughly clean before the concrete was applied.

Before placing concrete in this dam or in the core wall of the earthen dam the foundation rock was thoroughly tested for leakage, and any seams discovered were filled with cement grout under pressure. (A brief description of this was given in Municipal Journal for March 9, 1916.) This work was described by J. E. Garrett. In grouting these foundations, holes were drilled vertically into the rock for a depth of 30 to 40 feet, and a pipe was then fastened with cement into the top of each hole. At first 1½-inch pipes were used, but these were found too small, and 2-inch pipes were substituted in the later work. Thin grout of cement and water was then pumped into the hole at a pressure of 80 to 100 pounds. If large seams took this grout too readily, it was thickened until it apparently began to stop the leakage, in some cases sand being added to assist in such stoppage. Following this the grout was thinned and cement only used, so that it should penetrate the minutest cracks and seams. Where the grout tended to escape through seams at the surface, the entire surface of the rock in the vicinity was covered with a layer of concrete, and this was allowed to set before pumping of grout was continued. After a row of such holes extending parallel to the axis of the dam had been grouted until they would take no more, another row of secondary holes was drilled parallel to the first, and these grouted under pressure in the same way. Ordinarily the secondary holes took very much less grout than the first line, since these latter filled all seams and crevices for a considerable distance.

USE OF METERS IN BOSTON METROPOLITAN DISTRICT

Abstract of Paper Before New England Waterworks Association—Consumption Reduced 32 Per Cent. in Nine Years.

Samuel E. Killam, superintendent of pipe lines and reservoirs of the Metropolitan Water Works, Boston, gave a history of the adoption of meters in that district, together with figures showing the results thereof. Boston first introduced meters in 1852 for the purpose of checking waste, the consumption of 55 gallons per capita being double what had been counted on. These were known as the Huse meter and were not very reliable. In 1861 there were 109 service meters in use, mostly on the services of the leading hotels. In 1871 there were 1,091 meters in service, but during the next nineteen years only 6 meters were installed. In 1879 the consumption in the high-service district, almost entirely domestic, was at the rate of 110 galions per capita during the day hours and at the rate of 72 gallons during the night hours (11 P. M. to 4 A. M.). In July, 1883, Dexter Brackett inaugurated a systematic inspection by operating Deacon waste detector meters and making house to house inspection, which resulted during the first four months in issuing 6,000 notices to stop waste of water from house fixtures. By this means consumption in some districts was reduced 35 per cent. This system was followed for ten years, but with decreasing diligence, and the checking of waste was not permanent, but the rate continued to increase, and in the early '90s it was apparent that the city had nearly reached the limit of its resources.

In 1895 the Metropolitan Water Board was created by the state and given power to furnish water to all municipalities within ten miles of the State House. The successor to this board, the Metropolitan Water and Sewerage Board, now furnishes water to 20 cities and towns, only one city, Newton, within the district being supplied from an independent source. Five pumping plants are now operated in place of twenty. In 1916 about 72 per cent of the entire supply was delivered by gravity directly to the distribution system, the remainder being pumped and 1.4 per cent being raised a second time.

In 1902 the board was authorized to provide facilities for measuring the water supplied to the several cities. The Venturi meter was adopted as the best and most suitable device to measure the large quantities required without too great loss of head. There are now 69 of these, varying in size from 6 inches to 60 inches. Of these, 54 are provided with registers type D, five with type M and one with type V. In districts where the quantity to be measured is small, Hersey Detector meters, model F. M., are used. The total cost to January 1, 1917, of installing these meters, including the registers and appurtenances, was $94,364. The total cost for charts and repairs to meter registers since their installation in 1903 has averaged about $3.50 per meter register per year, of which $3.25 was for charts.

In 1904 it was ordered that the water assessment on each municipality supplied by the board be based on the

valuation and consumption after the year 1905, on the ratio of one-third valuation and two-thirds consumption. In 1907 it was ordered that after January 1, 1908, all cities and towns that derived their supply from the Metropolitan Water Works should equip all new service pipes with water meters and should also equip annually with meters 5 per cent of the services that were unmetered on December 31, 1907, and should thereafter charge each consumer in proportion to the amount of water used. (Several of the municipalities have installed meters on considerably more than 5 per cent of the old services per year and eight are 100 per cent metered.) In the nine years since this progressive metering began the average consumption of the district has been reduced from 130 gallons to 89 gallons per capita per day, or nearly 32 per cent.

Night Consumption and Percentage of Services Metered in Each City and Town of the Metropolitan District.

City or Town.	Per cent. of Services Metered. Jan. 1, 1907	Jan. 1, 1916	Consumption per capita, 1 a. m. to 4 a. m. 1907	1916
Arlington	33.6	100.0	50	28
Belmont	100.0	100.0	31	18
Boston	5.5	53.2	107	62
Chelsea	14.6	99.7	59	35
Everett	2.0	50.0	50	42
Lexington	2.1	92.0	43	37
Malden	93.6	95.5	22	28
Medford	10.5	100.0	65	22
Melrose	3.9	100.0	85	26
Milton	100.0	100.0	16	10
Nahant	17.2	64.1	50	51
Quincy	14.2	88.6	66	39
Revere	4.8	70.8	54	34
Somerville	24.6	69.2	55	34
Stoneham	1.9	98.5	55	29
Swampscott	37.8	100.0	41	28
Watertown	98.3	100.0	36	29
Winthrop	2.3	100.0	65	26
District	14.7	66.8	88	51

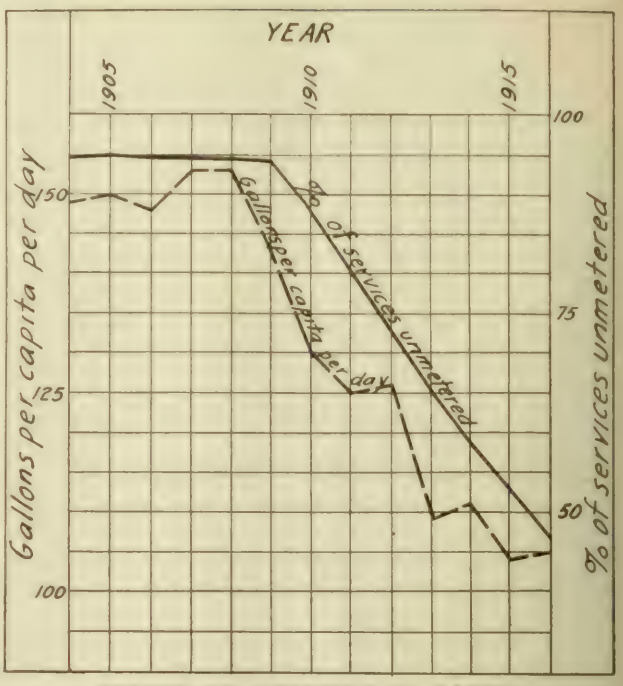
The city of Boston has been divided into seven districts by master meters, and the average per capita consumption of each at three-year intervals is given in the accompanying table. The southern low-service district

Per Capita Consumption in Boston at Three-Year Intervals, by Districts.

District by Services.	1907	1910	1913	1916
Southern Low	148	128	126	115
Southern High	162	128	100	105
Charlestown	200	188	114	113
East Boston	130	110	58	61
Brighton	132	107	77	89
West Roxbury	130	132	92	57
Breeds Island	63	53	35	31
Total	153	130	109	105
Per cent of services metered	5.6	12.5	34.8	53.2

comprises the lower area of the city proper, in which is located the greater part of the business and manufacturing plants, railroad terminals and electric light and power plants All the other districts are residential, although the southern high-service district includes several of the largest hotels and some business and manufacturing plants. In East Boston and Charlestown considerable quantities of water are used by railroads and shipping and some by manufacturing plants. The effect of the use of service meters upon consumption of water is very graphically illustrated by the accompanying diagram showing the daily number of gallons used per capita in the city of Boston and the percentage of unmetered taps for each year from 1904 to 1916, inclusive.

In Melrose, which is largely residential, the reduction due to the installation of service meters has been especially noticeable, as shown by the table.



EFFECT OF METERING IN BOSTON.

Consumption Per Capita in Melrose, Mass.

	1907	1909	1916
January	113	60	43
February	125	61	43
March	116	58	44
April	109	60	43
May	111	63	46
June	120	71	46
July	122	71	45
August	131	66	49
September	116	63	49
October	115	61	47
November	113	60	45
December	115	55	44
Year	117	62	45
Per cent of services metered	3.9	100	100

In spite of the considerable reduction effected, the consumption between 1 and 4 A. M. averags a rate of 51 gallons per capita for the entire district, which Mr. Killam believes to be strong proof that a large amount of preventable waste is still taking place. However, if the population of 1916 had used water at the rate existing in 1907, the consumption by the district in 1916 would have been 48,799,000 gallons more per day than it was. This reduction of consumption has postponed for years the necessity of constructing new works to increase the supply at an estimated cost of $32,000,000, besides reducing the cost of maintaining the existing works.

MOTOR TRUCK OPERATION RECORDS IN CHICAGO.

At the beginning of 1916, the former Pipe Yard was made a division of the Water Department of Chicago. To this division was transferred the storage and handling of all of the stock materials used in the Department of Public Works. It is necessary to have ample facilities for prompt distribution of materials to all parts of the city and a fleet of motor trucks were secured for the work. The operation of this fleet has permitted a reduction in the number of hired teams and a proportionate reduction in the cost of hauling. Complete costs of operation for the fleet are shown in the table.

The Pierce-Arrow trucks, 1, 2, 3 and 4, are used for general delivery from warehouse and pipe yards. The Kelly-Springfield 1-ton trucks, 5, 6 and 7, are run on 24-

hour service with two or three drivers, being used on water pipe extension work. No. 10 is used for delivering Police Department supplies and Nos. 11 and 17 on meter division work. No. 8 is on general delivery work and the others chiefly on extension, construction and testing work. No. 14 is a car equipped with a centrifugal pump and is used to test mains.

RAPID SAND FILTRATION

History of Its Development—Negative Head—Essentials of Filter Washing — Rate Control — Red Water Troubles—Hoover Aluminum Sulphate.

An exhaustive paper on this subject was presented before the New England Water Works Association September 12th, by George A. Johnson, of which only a brief abstract can be presented. The first municipal rapid sand filter was built at Somerville, N. J., in 1885. Five years later 310,000 population of this country was supplied with water filtered by both slow and rapid sand filters, which number in the 27 years since then has been increased to 18,293,000. The percentage of population of the country receiving filtered water increased more than 25 times, and in the meantime the typhoid death rate decreased 75 per cent. In January, 1917, rapid sand filtration was in use in 682 municipalities of the United States and 39 of Canada, serving a population of 13,411,000 in U. S. and 1,000,000 in Canada. Since 1910 the population served by rapid sand filters has increased 94 per cent. and the combined capacity of such filters has increased 139 per cent. This increase was principally due to the construction of large filter plants, such as those at Akron, Baltimore, Dallas, Erie, Grand Rapids, Minneapolis, St. Louis and Trenton, these eight plants alone providing a filtering capacity of 462,000,000 gallons and serving a population of 2,400,000.

The first comprehensive tests of the rapid sand process were conducted at Providence, R. I., in 1893-4, and more exhaustive ones in Louisville, Ky., in 1895-7. Within the next seven years investigations were carried on at Pittsburgh, Cincinnati, Washington, New Orleans and Harrisburg. These served more than anything else to establish on a sound footing the entire reliability of rapid sand filtration and were followed by a decade of extreme activity in filter construction.

Students of water purification have concluded that where water is markedly colored or possesses a turbidity of more than 30 parts per million, or where there are sharp fluctuations in the character of water ordinarily but slightly colored, rapid sand filters are best adapted to its purification, as compared with slow sand. The majority of American rivers come under one of these classes, especially that of high turbidity, which explains the reason for the more rapid growth of rapid sand than of slow sand filters.

The use of a coagulating chemical has always been a standard procedure in rapid sand filtration and it was this idea that was originally patented by John W. Hyatt in 1883. Usually sulphate of aluminum or iron is used These coagulants remove much of the suspended and some of the dissolved impurities and thus relieve the filter of much of its burden. Delay of coagulation of the water until after it reaches the filters is to be guarded against, for which reason sufficient time must be allowed between the adding of the coagulant and the application to the filter. On the other hand, it should not be so long as to allow the removal by sedimentation of too much of the coagulated floc, some of which must collect in the filter itself to enable it to operate thoroughly. There are, however, some rapid sand pressure filters operating efficiently on relatively clear waters with no coagulating and settling basins ahead of the filters.

Before 1900 it was the practically uniform custom to build rapid sand filters of wood or steel tanks circular in form, each unit having a capacity of about two-thirds of a million gallons per day. The plant at Little Falls, N. J., constructed in 1902 marked the beginning of the present practice of building rectangular concrete tanks in larger units, the largest units being those at Cincinnati, which have a capacity of about 4,000,000 gallons each.

Rapid sand filters may be operated efficiently with either positive or negative head; in fact, the outlet piping on most rapid sand filters is so arranged as to allow of the utilization of negative head. (By negative head is meant

OPERATION OF BUREAU OF ENGINEERING MOTOR-TRUCKS, CHICAGO.

No.	MAKE	Capacity	Bought	Cost	Depreciation to Jan. 1, 1917	Present Value	*Cost of Operation and Repairs for 1916	Miles Run in 1916	Ton Miles	Cost per Mile	Cost per Ton Mile
1	Pierce-Arrow	5 Ton	Mar., 1914	$4,960.00	$1,439.33	$3,520.67	$3,846.07	10,523.6	24,351.76	$0.38	$0.16
2	Pierce-Arrow	2 Ton	Mar., 1914	3,245.00	1,083.31	2,161.69	2,877.88	11,585.7	9,519.51	.25	.30
3	Pierce-Arrow	2 Ton	Mar., 1914	3,245.00	1,026.12	2,218.88	3,169.21	9,633.4	9,024.76	.33	.35
4	Pierce-Arrow	2 Ton	Mar., 1914	3,245.00	1,041.16	2,203.84	2,977.85	10,998.7	10,109.58	.27	.29
5	Kelly-Springfield	1 Ton	Mar., 1914	2,300.00	605.41	1,694.59	4,367.32	7,644.4	.....	.57	.....
6	Kelly-Springfield	1 Ton	Mar., 1914	2,300.00	386.83	1,913.17	2,437.21	3,979.9	.....	.61	.....
7	Kelly-Springfield	1 Ton	Mar., 1914	2,300.00	751.36	1,548.64	3,602.30	14,773.9	.....	.24	.....
8	Ford	800 Lbs.	June, 1914	570.00	213.83	356.17	990.00	7,533.1	.....	.13	.....
9	Ford	800 Lbs.	June, 1914	570.00	268.88	301.12	1,068.33	9,999.1	.....	.11	.....
10	Ford	800 Lbs.	April, 1915	496.25	139.15	357.10	1,475.73	9,764.8	.....	.15	.....
11	Ford	800 Lbs.	April, 1915	496.25	113.94	382.31	1,395.64	7,048.6	.....	.20	.....
12	Ford	800 Lbs.	April, 1915	416.25	186.81	229.44	1,158.83	10,482.6	.....	.11	.....
13	Ford	800 Lbs.	April, 1915	416.25	148.51	267.74	1,286.64	9,035.9	.....	.14	.....
14	White	1 Ton	Nov., 1915	3,193.82	279.80	2,914.02	1,822.15	7,463.2	.....	.24	.....
15	Ford	1 Ton	Sept., 1915	498.00	128.37	369.63	1,717.75	8,721.9	.....	.20	.....
16	General Motors	1½ Ton	April, 1916	2,205.00	134.99	2,070.01	1,558.02	6,136.2	.....	.25	.....
17	General Motors	1½ Ton	April, 1916	2,205.00	125.23	2,079.77	1,201.22	5,692.4	.....	.21	.....
18	General Motors	1½ Ton	April, 1916	2,205.00	129.63	2,075.37	1,505.43	5,892.3	.....	.25	.....
19	Ford	800 Lbs.	Aug., 1916	563.08	34.96	528.12	629.45	3,495.6	.....	.18	.....
20	Ford	800 Lbs.	Aug., 1916	563.08	35.84	527.24	598.43	3,584.2	.....	.17	.....
21	Ford	800 Lbs.	Aug., 1916	563.08	25.75	537.33	540.11	2,574.6	.....	.21	.....
22	Ford	800 Lbs.	Aug., 1916	563.08	37.26	525.82	602.97	3,725.6	.....	.16	.....
23	Ford	800 Lbs.	Aug., 1916	563.08	29.49	533.59	545.60	2,948.6	.....	.18	.....
24	Ford	800 Lbs.	Aug., 1916	563.08	24.22	538.86	507.61	2,421.6	.....	.21	.....
25	Ford	800 Lbs.	Aug., 1916	501.76	38.43	463.33	558.37	3,843.0	.....	.14	.....
26	Ford	800 Lbs.	Aug., 1916	501.76	51.63	450.13	†296.69	5,163.0	.....	.06	.....
27	Ford	800 Lbs.	Aug., 1916	501.76	35.27	466.49	545.22	3,526.6	.....	.16	.....
28	Ford	800 Lbs.	Aug., 1916	501.76	36.60	465.16	582.24	3,660.3	.....	.16	.....
29	General Motors	1½ Ton	Sept., 1916	2,205.00	65.57	2,139.43	524.43	2,980.5	.....	.18	.....
30	General Motors	1½ Ton	Sept., 1916	2,205.00	36.28	2,168.72	447.87	1,640.0	.....	.27	.....
	Total	.....	.....	$44,662.34	$8,653.96	$36,008.38	$44,836.57	196,473.3	53,005.61		

* "Cost of Operation and Repairs" includes supplies, repairs, interest, depreciation, garage overhead, and drivers' salaries, except as noted. † No driver's salary included.

any head in excess of that corresponding to the depth of the column of water standing over the filter surface.) In such cases a partial vacuum is formed beneath the clogged surface layer and produces what is in effect a suction action on the sand layer itself. Mr. Johnson discussed at some length the effect of negative head, the compacting of sand due to high velocity, the drawing of the suspended matter down into the bed, even after it had collected on the surface, and other details of the action of the rapid sand filter. Following this he described the successive methods of washing rapid sand filters, condensing this considerably as it was to be discussed later by Mr. Weston, as described in last week's issue. After making a comparison of methods, he stated that there are certain essentials of cleaning which do not allow of argument, these being that the gravel layer must not be unseated and so mix with the sand; the filter bed proper must be floated and so made amenable to thorough and economical washing; the upward flow of wash water must not be so great as to carry away with it appreciable quantities of the filter sand; the washing action must be such that masses of clogged sand will be broken apart so that the foreign matters will be separated from the sand; and, finally, but by no means least, the foreign matters thus separated from the sand must be carried upwards and out of the filter tank with the wash water.

One of the cardinal necessities in filter operation is the control of the rate of passage of water through the filter. Sudden fluctuations of more than 5 per cent have a marked disturbing influence on the condition of the filter bed and quality of the filtered water. Gradual variations in the rate of filtration, if relatively small, are of practically no significance, except perhaps where a material reduction in the velocity of flow of water will sometimes allow occluded air to pass upwards and break through the surface, the most effective part of the filter bed. The natural clogging of a filter takes place gradually, and where the rate is practically constant the frictional resistance to the flow of water builds up proportionately. Sudden increase in the velocity of flow through the filter will break the delicate clogged strata in the filter and carry the foreign matters causing them deep into the filter and even completely through it. The normal functions of the filter are thereby temporarily upset and the quality of the effluent is deteriorated.

The first effective automatic filter controller was that designed by E. B. Weston in 1899, and used in a very large number of plants. In this device the velocity head, or an artificially created difference in head in the effluent pipe, regulates the area of a discharge orifice. There are several automatic rate controllers of the Venturi type which are widely used, a Venturi tube being placed in the effluent pipe and beyond this a valve opening is regulated by the position of a piston contained in a cylinder, the pressure on the upper side of the piston being transmitted from the throat of the Venturi and that on the under side of the piston from the pipe beyond the Venturi.

Discussing the connection of rapid filtration with red water troubles, Mr. Johnson stated that if more alum is added than can be decomposed by the natural alkaline constituents of the water or by alkalies artificially added, the free alum renders the water acid and it will then undoubtedly corrode service pipes. But if the coagulating chemical is used as it should and always can be, no free alum reaches the effluent. It is possible, however, that small amounts of free carbonic acid will be liberated from the coagulating chemical when decomposed, which acid encourages corrosion; but this can easily be nullified by aeration of the filtered water. Special difficulty in this respect is found in treating soft surface waters that are relatively high in color and contain peaty organic matter. These waters are usually high in free carbonic acid, and when they are treated with aluminum sulphate to remove the color, this natural free carbonic acid is increased by some 4 parts per million to each grain per gallon of added coagulent. An efficient remedy is the aeration of the filtered water, whereby the bulk of the carbonic acid is dispelled. If the case is serious, the addition of alkalies will entirely eliminate the free carbonic acid, but this remedy is much less satisfactory than aeration.

The manufacture of aluminum sulplate at the filtration plant, as developed by Chas. P. Hoover at Columbus, Ohio, was described by Mr. Johnson. A plant capable of turning out a ton of alum per day occupies a space about 15 by 25 ft. and 10 ft. high, in addition to which storage space is required for the bauxite and sulphuric acid used in the manufacture. The only labor required is that of proportioning the raw materials, supervising their mixing by a small motor, discharging the mixture into crystallizing boxes and later removing the hardened cakes. Alum produced by the Hoover process is basic aluminum sulphate, which is even more effective per unit of weight than the ordinary commercial aluminum sulphate purchased in the open market. It contains from 7 per cent to 10 per cent of finely divided insoluble suspended matter which, by virtue of its very fine subdivision, serves as a nucleus around which the floc can form. Prices now are fluctuating, but roughly speaking 60° Beaume sulphuric acid can be bought for $20 a ton f. o. b. point of manufacture, and pulverized bauxite at $15 per ton at Bauxite, Ark. This gives the cost for raw materials to make a ton of 17 per cent aluminum sulphate about $19 plus freight, which would bring the total to about $25 in New England; to which labor, repairs and other incidental charges would add about $2. The Hoover process is now used in Springfield, Mass., Trenton, N. J., Cumberland, Md., Columbus, O., Omaha, Neb., and Montreal, Quebec; while a plant for making 1,500 tons a year is now being built at Little Falls, N. J.

Pressure filters are now operating on municipal supplies in 140 places with a total population of a little under 2,000,000. The individual plants range in size from 100,000 gallons per day up to the 21,000,000-gallon plant at Atlanta, Ga. They are filtering about 1.8 per cent of the amount of water being treated by rapid sand filters. The first rapid sand filters for municipal supplies were of the pressure type, but for some reason improvements in the pressure filter have not been made as rapidly or completely as with the gravity type. The model pressure filter of today, however, can be fitted with rate controllers and devices for accurately proportioning the dose of coagulant. In fact, everything that can advantageously be built into a gravity filter system is equally applicable to pressure filters. The pressure filter is particularly adapted to water problems where double pumping is an important item of expense, since with this type one pumping may be avoided. Where other conditions favor pressure filters, any deficiency of these in removing bacteria is relatively immaterial, since by modern sterilization, any bacteria remaining in the effluent can be positively disposed of.

CLEANING SEWERS IN CHICAGO.

In the seven sewer districts of Chicago during 1916, 7,416,900 feet of sewers were flushed at a cost of $42,496.72, or 57 cents per 100 feet; and 699,800 feet of sewers were scraped, this costing $57,329.70, or $8.19 per 100 feet. The cost of cleaning catch basins was rather low, being $2.97 each. At a cost totaling $146,459.26, 49,308 catch basins were cleaned. In all $306,399 were spent on work of this sort.

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DECREASING PLANT DEPRECIATION CHARGES.

"A penny saved is a penny earned," and a piece of equipment kept in good condition for future use is practically as good as a new one, and the cost of maintenance is much less than the purchase price. One of the contractors whose labor-saving appliance we have described recently said that this appliance had already saved its entire cost, but he said nothing about throwing it on the scrap heap on that account.

Too many contractors and municipal departments, however, are hastening the approach of scrapping time by neglect of their apparatus and other working capital. Engines, mixers and other appliances left standing all winter exposed to the weather deteriorate more during those three to five months than they do during the remaining months of the year of active use. Such neglect, therefore, divides their useful life by two or more and multiplies the annual depreciation charge against the work by the same figure. This applies to wagons, sheds and other buildings, and other wooden as well as metal structures.

All machinery should be housed or at least well protected from the weather by canvas covers; but even this will not wholly prevent rusting. It is well worth while to carefully go over each machine at the end of the working season, thoroughly covering all wearing parts and other bright metal with heavy grease, and painting all other surfaces. Wooden surfaces should be kept painted at all times, receiving a coat every year, and the best time is in the fall when work stops for the winter, for this is a defense against weathering during the winter, can be done after the busy season is over, when labor is plentiful and the appliances are not in use, and the painting will not need to be rushed through in the spring when everything may be on the jump to take advantage of favorable weather or an early contract.

A few gallons of paint applied each fall is a low price to pay for doubling the life of a valuable plant.

ROOF CONSTRUCTION FOR RESERVOIRS AND FILTERS.

For perhaps twenty-five years the construction of concrete roofs for filters and covered reservoirs has been practically standardized and the groined arch has been used almost exclusively. It is therefore the more remarkable a coincidence that two widely separated reservoirs described in the same issue of Municipal Journal should both have adopted the beam and flat slab construction for their roofs. The filtered water reservoir at Wilmington, Delaware, and the two circular reinforced concrete tanks at Lansing, Mich., are the structures referred to, both of which were described in the September 6th issue. In neither case did the engineer writing the description explain the cause for adopting the flat roof instead of the groined arch, although each called attention to the unusualness of the construction. These departures from the monotony of the groined arch roof will probably cause engineers to consider whether the conditions confronting them from time to time might not render some other type of construction preferable from a financial or other point of view.

BABY CARRIAGES AND GUTTERS.

The writer of a short article on another page of this issue calls attention to the fact that in the designing of street details no provision has been made for eliminating the difficulty of wheeling baby carriages across streets of ordinary construction in which there is a 6-inch drop or rise at each curb line. The point is certainly well taken for those sections of cities where baby carriages are numerous, which will include most of the residential sections, especially the newer ones. The use of gutter bridges or flush roadway crossings would meet the objectionable feature pointed out and also make walking easier for all pedestrians; but where these are not provided there would seem to be no good reason why the plan proposed by him of sloping the sidewalk down to the gutter level, omitting the curb for a length of 30 or 40 inches, is not practicable, although the placing of it at the junction point of the curb lines would seem to have several objectionable features. Such an incline placed just back of the cross walk would be practically a duplicate of the construction employed where driveways are carried across sidewalks, except that it could be made much lighter and also probably steeper and thus occupying less width of the sidewalk space.

As to the advantages suggested—that it would be appreciated by the users of bicycles and wheelbarrows, also—this is, in our opinion, a decided disadvantage, since most cities have an ordinance denying the use of the sidewalk to such vehicles, and anything which encourages a violation of this ordinance is objectionable. A construction which would offer practically all the advantages for baby carriages and at the same time interfere with the use of the crossing by bicyclists is the use of the flush crossing with a gutter cut through it. Such a gutter, a foot wide, can easily be crossed by baby carriages witout a jolt but are impracticable to bicyclists and difficult for wheelbarrows. This, however, requires the elevated crossing construction, which is decidedly objectionable where traffic uses the sides as well as the

center of the road. Where elevated crossings are not used, the suggestion given in the article is perhaps the best solution, where any seems to be called for.

LOWER LIGHT AND WATER RATES.

Beginning September 15, the Greenwood Light and Water Plant of Greenwood, S. C., has put in effect a lower rate for water and electric current "to aid the people in meeting the high cost of living." This plant, which is municipally owned and operated, has long granted very low rates, meanwhile running at a profit. The new rates for water are 15 cents per thousand up to ten thousand gallons and 12½ cents for all over that amount, with a minimum charge of 50 cents. The charges for power are 8 cents per kw. h. up to 100 kw., 7 cents for all over 100 and less than 500 kw. and 5 cents for all over 500 kw. A special rate of 3 cents is given for heating and cooking, or, with a minimum of $5 per month, a flat rate of 2 cents per kw. The minimum monthly charge is 75 cents. Daylight power service varies from 7 cents to 2 cents, depending on the quantity used. All rates are slightly increased for those living outside the city limits.

MUNICIPAL WORKS RATE REVISION.*

Summary of and Conclusions from Investigation of Water Rates Made by City of Waltham.

We attempted to provide for a period of five years in Waltham. It is a very difficult task to plan so far ahead. The writer knows of one case at least where provision for a fair return is made by giving the water takers an annual discount. The surplus, if there is any, is returned to them in this way each year, while the rates remain unchanged.

While it is a fact that we would, if making a new study of the rates today, follow practically the same general course that we did in 1915, it should be stated that subsequent experience and reflection call for some modifications in the program. In the main, however, the methods adopted in Waltham were simple and direct and in retrospect seem wise. Here is a basis for further revision which can be followed from time to time as conditions change.

The writer believes that it is only fair and logical for the Water Department to pay taxes on its property, and also that the city should be charged a fair rate for what water it uses as well as for hydrant service. As a basis, therefore, for rate fixing, he would charge a fair price for everything furnished the city and, in return, hold the Water Department to a strict accounting for all it receives. He would not, however, provide for a franchise tax. If it had received but $50 per hydrant, the Waltham Water Department could have paid taxes on the value of its plant and in 1916 would have made a further profit to the department of more than $3,000 on the deal.

The evil practice of taking water works earnings for general municipal expenses should be stopped. There ought to be some law to prevent an improvident city government from using the water takers' money to keep down the tax rate and so pull some politician's "chestnuts out of the fire." This has been done altogether too often.

The great advantage of an attempt to inform the public is, of course, to make clear to all the necessity of looking ahead. Without a careful foresight as to the expenditures which are sure to be required as well as the probable additional demands, there is always danger that the public may call for the distribution of any surplus which may temporarily accumulate. It is not necessary to emphasize the difficulty in increasing rates to cover a shortage as contrasted with the ease of a reduction. Arguments in favor of a reduction in rates always meet with a favorable reception, and they can be answered the more effectively the more widely the real facts are disseminated. Frequently they are advanced by parties who ought to be fully posted, but who, for reasons of their own, prefer to cater to popular sentiment rather than to use their influence to the real advantages of the public, and appeals such as this cannot be ignored or overlooked with safety. They can only be offset by a painstaking exposition of the true situation.

One of the most effective of the arguments which are advanced is based upon the feeling that the poor ought to get things as cheaply, if not more cheaply, than the rich. In Waltham this has gone so far that an ex-mayor is actually advocating in the public prints a rate of one and one-quarter mills per cubic foot for a minimum annual consumption of 4,000 cubic feet, and a rate of one and one-half mills per cubic foot for a consumption anywhere between this 4,000 and the point where the wholesale rate begins to apply. This in place of the rates of two mills and one and one-tenth mills for domestic and wholesale consumption which now apply. This is quite antipodal to the famous Vanderbilt policy and serves to emphasize the fact that the idea that those who have money must pay the way for those who have little or none is very popular today and that, whatever we may think of it, it has got to be reckoned with.

We sympathize with the industrious poor man, who is raising a family of children or who has raised such a family, many of whom are just now offering their lives to the country. We believe that such men will have more to say about these matters in future than in the past. We would surely like to have them get their part of the water supply at cost. We sympathize also with the great middle class which seldom complains, does most of the real thinking in the world, and is subjected to a constant grinding between the "upper and nether millstone."

The wholesale user now gets the low price in Waltham and in most other places. He also gets the free fire service. Perhaps this is right to a certain extent, but we must bear in mind that the poor man is becoming fully as important an element in democracy as his richer brother. It is well, therefore, in America, and in these times, for the management to consider this element in municipal service. It's no use to be officially blind to the signs of the times.

The question of relative rates for different services is, however, only a part, though an important part, of the problem. The main question is rather the necessary amount to be charged upon consumers in order to cover cost. This question, the writer maintains, can be solved satisfactorily only by careful study of future developments, based upon the lessons of the past. There is no panacea for all the difficulties of rate fixing; but the ideal for which we must strive, namely, a square deal and equal privileges for all, can only be reached when we have acquired sufficient wisdom from experience to decide how long to rest upon established order and when to cut loose and go ahead.

*Concluded from page 286.

STREET NAMES IN CURBS.

Tucson, Ariz., is to abandon the use of wooden street-name sign posts and instead will have the letters depressed in the concrete curb and painted black. The city engineer informed the city council that this could be done by city labor at a cost of about 80 cents per corner and on the strength of this council decided on September 5 to authorize this construction.

The WEEK'S NEWS

State Highway Progress in Oregon, South Dakota, West Virginia and Tennessee—Infantile Paralysis in Chicago and West Virginia—Infant Mortality Reduced in Big Cities—More Wanaque Litigation—Firemen's Labor Conditions in Duluth and Yonkers—State Control of County Work—Philadelphia Mayor Mixed Up in Election Murder—Progress on Hetch-Hetchy—Indianapolis Gas Shortage—Metering Steam Heat.

ROADS AND PAVEMENTS

Road Laborers May Work Overtime.

Salem, Ore.—In an opinion to labor commissioner Hoff, attorney general Brown has held that the highway commission is empowered to declare highway work an emergency under the eight-hour law, and work men on road work over eight hours a day, provided they are paid for the overtime. The highway commission recently passed resolutions declaring the construction of certain highways to be emergencies.

Road Finances in South Dakota.

Pierre, S. D.—If the different counties are ready to meet their share of the expense, South Dakota will spend $1,000,000 on highways within the next year and keep up the expenditure for several years. The money is to come from the counties themselves, the state and the national government. The state highway commission is composed of governor Norbeck, state engineer Derr and Frank S. Peck, the engineer who has had supervision of the construction of highways in Lawrence county, which has built more hard surface roads the past few years than any other county of the state. This board recently organized. The board will work along lines of highway construction which the federal government requires, and when they meet these requirements they will have a quarter of a million dollars of government funds available this year, and a like sum at the end of June next year. The state appropriated a quarter of a million dollars of which $200,000 have been apportioned, and the balance is being held for emergency work in the projects which are to be looked after for the year. Under the apportionment of state and federal funds Minnehaha county would be asked to raise a little more than $47,000 local funds to secure the benefit of the state and federal appropriations. Roberts county would have to raise almost $26,000 to get its share.

State Road Aid in West Virginia.

Charleston, W. Va.—The state road commission recently completed its apportionment of state and federal aid funds among the counties of the state for use in construction of Class A roads, based upon the amount of revenues received from issuing automobile licenses and tags, in addition to funds available from federal aid. The total sum apportioned is $435,860, of which Kanawha gets the largest amount, $12,160; Pocahontas second, with $12,065; Randolph third, with $11,875; Greenbrier fourth, with $11,400. Each county is required under the state road law to contribute a sum equal to the apportionment given it, and as much more as its county court desires to put in its road building. The commision at the time of the apportionment had collected the following:

Automobile licenses 1 to 26,400, inclusive	$291,102.31
Dealers' licenses 1 to 406, inclusive	6,075.56
Chauffeurs' licenses 1 to 1410, inclusive	4,322.05
Motorcycle licenses, 1 to 600, inclusive	3,001.19
Total	$304,606.19
Refund to County and State Institutions	128.90
Balance	$304,477.29
Total expenditures to date, including tags	18,252.52
Net Balance	$286,224.77
From Federal Government 1917 apportionment	52,270.46
From Federal Government 1918 apportionment	104,540.92
Total balance of fund	$443,036.15

The commission has found that there are approximately 4,588 miles of Class A roads to which it has apportioned $435,860, feeling that the collections for the remainder of the fiscal year will take care of the unexpected appropriation for the administration work of the department. According to the law passed by the last legislature, Class A roads must traverse the counties in such a direction that they shall link up with other roads of the same class in adjoining counties, and at least one of the two Class A roads in each county must pass through the county seat. In general these roads will run east and west and north and south. The law provides that the state aid is not applicable unless the provisions of the law are fulfilled.

Engineer Wins Bonus for County Work.

Wilkes-Barre, Pa.—David A. Keefe, of Athens, Pa., engineer for Luzerne county in the construction of the Nanticoke bridge, is entitled to a bonus of $2,500, offered him by the county commissioners if the bridge were completed in a stated time. Opinion handed down by judge Strauss sustains the contention of the engineer in the latter's suit against the county. County controller Fuller R. Hendershot refused to pay the bonus. He claimed there was no legal consideration and that no service was performed, and therefore the county commissioners exceeded their authority in entering into a contract that would grant a bonus. Keefe promised to have the bridge completed for traffic within one year. The bridge was opened within the year, but not completed until about a month after the allotted time, engineer Keefe claiming that the county was responsible for this delay. Keefe's contract was dated February 13, 1913, and he was to prepare the plans for the bridge and oversee its construction. He was to receive five per cent of the cost of the bridge as his commission and provided the bridge was completed within one year he was to get a bonus of $2,500. The Dravo Construction Company of Pittsburgh received the contract and began work on July 14, 1914. The bridge was opened within the year, but there were some minor details to be arranged.

Tennessee Highway System Planned.

Nashville, Tenn.—The Tennessee highway commission has laid out a system of state highways following weeks of careful consideration of the state's many road problems. The state highway engineer submitted a report showing in detail the character and condition of every mile on the Memphis to Bristol highway and the Dixie highway, the two important thoroughfares, which will claim the attention of the department this year. This report carried estimates of the cost by counties to improve the missing links in these two highways, which will total approximately $1,350,000. When these are completed the state will have, at least, one good highway entirely across the state from the northeast corner to the southwest corner, and another across the middle of the state from the northwest to the southeast. These two roads cross at Nashville, the state capital, and it is claimed will serve two thirds the population of the state, besides giving tourists good roads in four directions through the state. Other state highways will be taken up next year. Work has been started in Hamilton and Franklin counties. "For years the Cumberland mountains have stood like an almost impregnable wall dividing and separating middle and east Tennessee," said Chairman Crownover of the commission. "We have been almost like two separate peoples, but we are going to

stretch two ribbons across this mountain." In the plan both the Memphis to Bristol and the Dixie highways pass through Rutherford county and as the county has failed of its own initiative to provide a right of way free from toll gates the commission directed the engineer to proceed at once to survey a road along the most direct and feasible route from Nashville to Murfreesboro and from Murfreesboro to Woodbury. Following the survey condemnation proceedings will be instituted and the county will be required under the law to pay all costs and damages.

SEWERAGE AND SANITATION

Chicago Fights Infantile Paralysis.

Chicago, Ill.—Twenty-five quarantine officers have been named by health commissioner Robertson to aid in the city-wide fight on infantile paralysis in Chicago. Funds for the work have been promised by the city council finance committee. A score of new cases each day has brought the total up above 120. Dr. Robertson has asked Peter Reinberg, president of the county board, to permit tuberculosis patients at the county hospital to be transferred to the municipal tuberculosis sanitarium to make room for the children sent to the county hospital with infantile paralysis. He has put new help to work in the health department laboratory to assist in the movement to stop the spread of the disease. Precautions of every kind are being taken in schools.

Federal Health Service Helps Fight Typhoid.

South Bend, Ind.—A hundred cases and several deaths due to typhoid have aroused the city to take vigorous measures to combat the epidemic. The city has called the United States Public Health Service to make a survey, but so far the origin of the epidemic has not been definitely traced—the water and milk supplies being suspected. Sanitary engineer John Diggs and Dr. Will Shimer of the state hygenic laboratory were sent to the city by the state board of health. Remedial measures for the immediate control of the epidemic were put in operation by city officials and the people of South Bend upon the advice of Major J. O. Cobb, of the United States public health service. The recommendations of Major Cobb were: Treatment of the city water supply by the installation of a chlorination apparatus. Boiling of all dug well water. The use of pasteurized milk or of boiled milk. Vaccination against typhoid. As a result of a conference of members of the board of health, mayor Keller, Major Cobb and the latter's assistant, Lieut. C. D. Akin, it was decided to institute these measures at once, regardless of the source of infection. The city officials took steps to provide a chlorination apparatus. The city health department and the federal health service advised that all water, city and well water, be boiled for three minutes. "Insanitary outhouses in use in South Bend, shallow wells that are found in the city, unprotected milk supply and the fact that there are always a few cases of typhoid in the city are the conditions that have caused the present typhoid epidemic," was the latest statement made by Dr. Will Shimer, of the state hygenic laboratory.

To Keep Disease Out of Army Camp.

Battle Creek, Mich.—Arrest, court-martial and imprisonment for any soldier who stops a woman on the street or is otherwise insulting; isolation and loss of pay for any soldier who contracts disease—that is the war department's program for soldiers and residents at Battle Creek and Camp Ulter. Reports from physicians on every case of venereal diseases brought to their attention, and isolation of the victim as strictly as though suffering from smallpox are planned, according to a report from colonel William H. Powell, sanitary inspector of the local war recreation board. Battle Creek will be well patrolled by provost guards, with orders to arrest any soldier who insults a woman or girl. Court-martial will follow, with terms of imprisonment based on the gravity of the offense. Furthermore, the man's name will be posted where every other soldier can read it, together with the punishment given him. Twice each month every soldier will be given a medical examination. All will, of course, start clean, "and the first sign of contracted disease will mean that the man has trodden forbidden paths." He will at once be placed in an isolation hospital, and his pay will automatically stop. At a meeting of the war recreation board Dr. J. H. Kellogg pointed out the city's part of the program. The state law asks physicians to report every case of venereal disease and asks civil authorities to isolate the victims. Neither is done. A movement is now on in Jackson, Kalamazoo and Battle Creek in particular to enforce both. A committee is to wait on chief of police W. H. Farrington and ask that as fast as syphilis victims are found they be detained. The entire war recreation board voted for this and for approving resolutions adopted at a conference of state authorities on sex diseases, in Jackson, asking governor Sleeper to name a commission to place venereal diseases under the same control as now checks smallpox, tuberculosis, and other contagious or infectious diseases.

Big Cities Reduce Infant Mortality.

New York, N. Y.—"The death rate among babies in the larger American cities has been reduced 11% since 1910, according to the infant mortality survey just completed by the New York Milk Committee. This reduction has been made among cities of 100,000 population and over. The smaller cities have not done so well. The reduction in cities between 50,000 and 100,000 population is only 2 per cent while those under 50,000 show an increase of 5 per cent. The general reduction is 9 per cent. The survey covers 150 of the largest cities in the Unitd States since 1906. The marked decrease in infant deaths did not begin until 1910 when organized infant welfare work became general. These 150 cities represent one-fourth of the population in the United States and they report 670,000 living births and 68,500 deaths under one year of age for the year 1916, making an infant mortality rate of 100 baby deaths for each 1,000 births reported," says J. H. Larson, secretary of the committee. "Or stated more clearly, it means that one baby out of every 10 born dies before it is one year of age in the cities of the United States with a population of 25,000 and over. Assuming that the statistics for these cities may represent the statistics for the entire population of this country, then we would have approximately 2,750,000 births and 275,000 deaths under one year annually. Besides this, it is now known that there occurs annually about half as many stillbirths as deaths under one year. Through general education, the baby milk station movement and other efforts along kindred lines, baby deaths have been reduced 9 per cent since 1910. It is recognized that through maternity care stillbirths can be reduced 22 per cent and deaths during the first month after birth can be reduced 28 per cent. Nearly half the deaths under a year are of babies less than a month old.

This country, following the example of Germany and Great Britain, is now beginning to think of a national maternity care program. When this movement gets under way it should save at least 75,000 mother and baby lives annually." During 1916 there were 68,500 deaths of babies under one year of age against an average of 75,075 for the 5-year period 1906-1910, showing a decrease of 6,536 infant deaths. The death rate of babies under one year of age per 1,000 born shows a corresponding reduction to the decrease in numerical deaths. The lowest infant death rate in the country in 1916 among the cities of 100,000 or over, was in Portland, Ore., with a record of only 55 baby deaths per 1,000 births. Fall River, Mass., is the highest with a rate of 163. In the second group, those with a population of 50,000 to 100,000, Hoboken, N. J., has the low rate of 7 against San Antonio, Tex., which has the high rate of 24 In the cities with populations of 50,000 and under, Brookline, Mass., leads with the remarkably low rate of 32 against Austin, Tex., whose rate was 182. Though there has been a general decrease for all the cities since 1910, the report for 1916 compared with those of 1915 are not so encouraging. In cities of over 100,000 population there was an increase in the number of baby deaths in 1916 of 1,573. Thirteen cities in this group showed reductions, New York City leading with a decrease of 1,048, and infant mortality rate of 93, the lowest in the history of the city. Other

cities of the group showing decreases were Philadelphia, 65—rate 101; New Orleans, 136—rate 96; Washington, 12—rate 105; Jersey City, 94—rate 102; Rochester, 2—rate 82; St. Paul, 56—rate 67; Denver, 40—rate 84; Portland, 17—rate 55; Oakland, 23—rate 65; Scranton, 139—rate 2; Grand Rapids, 8—rate 113; Spokane, 11—rate 57; Albany, 67—rate 96.

The cities in this group showing increases were Chicago, 683—rate 111; St. Louis, 62—rate 85; Boston, 19—rate 104; Cleveland, 115—rate 102; Baltimore, 150—rate 118; Pittsburgh, 111—rate 111; Detroit, 348—rate 117; Buffalo, 115—rate 113; San Francisco, 61—rate 79; Milwaukee, 187—rate 113; Cincinnati, 118—rate 95; Newark, 84—rate 89; Los Angeles, 21—rate 69; Minneapolis, 121—rate 87; Indianapolis, 29—rate 86; Providence, 34; Louisville, 31—rate 108; Columbus, 85—rate 89; Toledo, 156—rate 111; Worcester, 94; Syracuse, 31—rate 98; New Haven, 55—rate 89; Birmingham, 21—rate 119; Richmond, 91—rate 136; Paterson, 58—rate 110; Fall River, 8—rate 164; Dayton, 76—rate 98; Lowell, 21—rate 156; Bridgeport, 67—rate 96.

Of the cities from 50,000 to 100,000 population there was an increase of 238 deaths. Fifteen cities in this group showed decreases as follows: New Bedford, 19—rate 122; San Antonio, 7—rate 246; Lawrence, 81; Yonkers, 48—rate 89; Somerville, 10; Troy, 48—rate 94; Utica, 131—rate 110; Ft. Worth, 27—rate 84; Schenectady, 33—rate 77; Hoboken, 16—rate 77; Manchester, 8—rate 155; Ft. Wayne, 17; Brockton, 19—rate 93; Wichita, 19—rate 74; Mobile, 4—rate 101.

Seventeen cities of this group showed increases as follows: Hartford, 9—rate 101; Trenton, 125—rate 124; Reading, 86—rate 174; Salt Lake City, 64—rate 89; Lynn, 27—rate 89; Springfield, 35—rate 86; Des Moines, 8; Elizabeth, 29—rate 94; Akron, 82—rate 99; Wilkes-Barre, 23—rate 143; Erie, 83—rate 113; Harrisburg, 5—rate 104; Holyoke, 27—rate 181; So. Bend, 53—rate 110; Altoona, 28—rate 84; Springfield, 1; Canton, 33—rate 109.

Of the cities under 50,000 there was an increase of 755 deaths under one year compared with 1915. Out of the 71 cities in this group, 21 showed reductions as follows: Augusta, 18; Berkeley, 10—rate 47; Superior, 9—rate 119; Newton, 15—rate 67; Galveston, 8—rate 74; Everett, 1; Cedar Rapids, 8; Perth Amboy, 6—rate 118; Jackson, 24—rate 106; Lima, 18—rate 78; Orange, 13—rate 91; New Rochelle, 22—rate 68; Norristown, 27—rate 120; Brookline, 2—rate 32; Kingston, 1—rate 100; Wilmington, 11—rate 146; Madison, 2—rate 45; Montclair, 2—rate 60; Concord, 1—rate 76; Raleigh, 13—rate 132.

Fifty out of these 71 cities showed increases as follows: Binghamton, 31—rate 139; Lancaster, 16—rate 97; Springfield, 28—rate 80; Rockford, 37—rate 99; Sacramento, 13—rate 82; Malden, 5—rate 55; Haverhill, 18—rate 89; Lincoln, 10—rate 80; New Britain, 13—rate 94; Salem, 21—rate 99; Topeka, 2—rate 84; Wheeling, 7—rate 134; Macon, 11—rate 129; San Diego, 24—rate 69; Kalamazoo, 4—rate 70; Flint, 24—rate 111; Racine, 43—rate 115; Tampa, 10—rate 107; Elmira, 2—rate 93; Quincy, 7—rate 94; Springfield, 36—rate 133; Roanoke, 36—rate 142; Auburn, 37—rate 85; East Orange, 5—rate 59; Pittsfield, 88; Jamestown, 29—rate 101; Mt. Vernon, 1—rate 87; Niagara Falls, 28—rate 131; La Crosse, 16—rate 49; Pasadena, 7—rate 48; Austin, 18—rate 182 Colorado Springs, 13—rate 104; San Jose, 34—rate 94; Lorain, 61—rate 181; Easton, 20—rate 119; Zanesville, 13—rate 124; Poughkeepsie, 19—rate 116; Danville, 9—rate 86; Waltham, 18—rate 38; Newburgh, 1—rate 117; Newport, 4; Watertown, 12—rate 127; Nashua, 20—rate 117; Elgin, 1—rate 86; Battle Creek, 6—rate 77; Green Bay, 42—rate 166; Alameda, 7—rate 50; Cumberland, 29—rate 114; Sioux Falls, 15—rate 99; Reno, 7—rate 67.

Special Sewerage Funds Transferable.

Reno, Nev.—Holding that the 1917 amendment to the city charter of Reno clearly gives the city council authority to transfer to the general fund money held in a special fund for the construction of a sewage disposal plant the state supreme court has granted the petition of the city for a writ of mandamus compelling city auditor C. H. Stoddard and city treasurer D. W. Dunkle to make the transfer forthwith. The opinion of the court was written by justice Sanders. Justice Coleman wrote a concurring opinion, and chief justice McCarran dissented in an opinion of considerable length, in which he discusses with considerable detail the various acts of the legislature relative to pollution legislation. Justices Sanders and Coleman each hold that the question of the pollution of the Truckee river or any other stream in the state was not invoved in the suit. In his concurring opinion justice Coleman says the "legislature decided to leave to the direction of the council what disposition to make of the money in the special fund." The petition for mandamus was filed after the city auditor and treasurer, who also are county officials, refused to transfer $25,895.40 collected through a special tax for the purpose of constructing a sewage disposal plant and standing in the name of a special fund for that purpose. The transfer was ordered by unanimous vote of the city council, the purpose being to place it in the general fund, to be used in the purchase of motorized fire department apparatus. When the case was presented to the supreme court attorneys for the city treasurer and auditor contended that the money sought to have transferred belonged to a special fund and under an act of the legislature of 1915 could not be transferred. They also contended that under anti-pollution legislation the city would face prosecution by the state in case the money was not used for the purpose for which it was accumulated.

Poliomyelitis in West Virginia.

Charleston, W. Va.—Ninety-four cases of infantile paralysis were reported to the state department of health in the month of August from eighteen of the fifty-five counties of the state according to a statement on the subject. Twenty of the cases were reported from Marion county, fifteen from Harrison and twelve from Wood. The other cases were scattered as follows: Barbour county, three; Braxton, two; Gilmer, two; Lewis, seven; Marshall, one; Mineral, four; Monroe, one; Ohio, four; Preston, four; Taylor, three; Ritchie, three; Tucker, four, Upshur, nine; and Wetzel, one.

Organized Hygiene Works in Dayton Schools.

Dayton, O.—The methods of teaching hygiene and gymnastics in the schools of the city are to be radically improved and put on a more scientific basis. Dr. F. L. Bucher, who was formerly medical inspector of the city's schools, has been appointed director of hygiene and supervisor of the teaching of hygiene for three years, beginning Sept. 1, 1917. His duties include the formulation of rules, methods and regulations for the work, to be improved by the superintendent of instruction. His salary will be $3,600 a year. Dr. Bucher has already developed plans for a system of instruction to be called "selective gymnastics." The principle is the thorough examination of every child, who is to be placed in a special group and given a special form of exercise depending on needs. Heretofore, as is the common practice, all children, regardless of age or physical condition, have been put in regular classes and given the same exercises. Every child is now to be examined with the aid of a recently invented machine, a type of dynamometer. Weakness in the various sets of muscles will thus be discovered and proper exercises to build up the organs assigned. Medical and dental inspection will continue, as under existing regulations. The teachings of hygiene will be supervised and a course of study and manual will be provided for the regular and systematic teaching of the principles of hygiene. The practice of corrective gymnastics will be improved.

WATER SUPPLY

City Wins in Wanaque Litigation.

Newark, N. J.—The supreme court at Trenton has decided the litigation over the development of the Wanaque watershed in favor of Newark. According to justice Black the right of the State Board of Conservation and Development to attach reasonable terms and conditions to its approval of the application of the North Jersey District Water Supply Commissioners for consent to divert water from the Wanaque for an additional supply for Newark and such other municipalities as may join was upheld. The decision is adverse to the Society for the Establishment of Useful Manufactures, which declares it has valuable rights in the Passaic river, of which the Wanaque is a tributary, and the society brought certiorari proceedings questioning both the right of the conservation board to confer authority to divert upon the district board and the reasonableness of the conditions sought to be imposed. Among other things the Society of Useful Manufacturers contends that the jurisdiction of the board of conservation was confirmed to giving or withholding its consent to the proposed diversion, and to nothing else. After reviewing the legislation bearing upon the subject justice Black concluded by saying: "We think it is too plain for argument that under this legislation the Board of Conservation and Development had not only implied, but expressed power to attach to its approval and consent the terms and conditions as shown in the record. In addition in what seems to us to be the clearly expressed intention of the legislature, these terms and conditions

are all strictly germane to the subject matter that was then before the board for action. They are necessarily incident to make effective, if not efficient, the approval and consent of the board. The construction contended for by the Society for the Establishment of Useful Manufactures is too narrow and artificial. It would strip such approval and consent of its vitality, and as we think in direct opposition to the expressed intention of the legislature." Following this, an order has been filed in the supreme court by justice Swayze dismissing the certiorari proceedings instituted by the Society for Establishing Useful Manufactures, involving the attack upon the action of the North Jersey District Water Supply Commission in granting permission to the city of Newark to use the Wanaque as an additional source of water supply. The motion to dismiss the writ heretofore allowed was made by Spaulding Frazer, as counsel for the North Jersey District Water Supply Commission. It is understood that the S. U. M. will file an appeal carrying up for review to the court of errors and appeals the judgment of the supreme court. The case may be taken up to the federal supreme court. Since early in the summer the water commission has been prevented by the court's action from prosecuting any work toward the development of the shed. In the meantime the date when Newark will have to get more drinking water is rapidly drawing nearer. For the question of the development to be thrown back upon the courts again for decision would mean a long delay and might force the city to buy additional water from the East Jersey Water Company. When the appeal is taken, it is the intention of the North Jersey District Water Supply Commission, acting for Newark, to ask the court to raise the stay which the appeal would automatically impose on further development proceedings. In applying to the court not to permit the appeal to hold up the development project, Mr. Frazer would argue that the case is one of public necessity, demanding immediate action by those concerned with supplying additional water. It would be pointed out that Newark's water consumption has reached the maximum of its supply and that it would take from two to three years under most favorable conditions to make the Wanaque water available. Meanwhile October 18 is the date set by the commission for a hearing at which may be represented such municipalities as desire to enter the Wanaque watershed development project. At this hearing Newark through its board of works will make a new application to the Water Commission to construct a reservoir and pipe line which will make possible an additional supply of 10,000,000 gallons of water daily for this city. It is not expected that any other municipalities will be ready to join in the project at that time. After the hearing the board of works and the water commission can proceed to make a new contract, such action being necessary because of the court proceedings that were brought by the Society for Establishing Useful Manufactures, resulting in the abandonment of the first contract.

Fuel Shortage During Change to Electrical Operation.

Mansfield, O.—State aid was sought by city officials in securing coal for use at the Mansfield waterworks main pumping station when it became apparent natural gas could not be used longer. For several days it had seemed that gas being supplied by the Medina Gas & Fuel Company through the Mansfield Gas Light Company could not be continued. Gas conditions throughout Ohio have become acute and in every direction gas has been taken from manufacturing concerns and held for domestic use. The normal pressure of gas used at the pumping station is 8 oz. At the plant the pressure was at 3 oz. This made it impossible to force water into the high lines in the southern and western sections of the city at a pressure even near normal. Through the efforts of R. E. Burger, general manager of the Mansfield Electric Light & Power Company, the Medina company was induced to give the city sufficient gas to maintain water service until such time as other arrangements could be made. This aid lasted only a day or so. Local coal dealers said they were powerless to relieve the situation. State aid to secure the necessary supply for the city was sought through the office of John Roan, of the state clearing house office. Enough coal was promised to take care of the plant. The waterworks plant is now in the midst of improvements and changes which when completed will permit the plant to be operated entirely by electricity purchased from the new plant of the Mansfield Electric Light & Power Company. The plant can now use 100 horsepower or about two-fifths of the total load. By December 1 service director Hursh believes that the entire plant will be in readiness to be operated electrically. In the past the plant has used 20 tons of coal a day, but now it uses 12 tons and the difference is made up by current.

Hetch-Hetchy Railway Completed.

San Francisco, Cal.—San Francisco has added another sixty-eight miles of railroad ready for operation to the municipal system, city engineer O'Shaughnessy having announced that the Hetch-Hetchy Railway is completed to the dam site, with the exception of ballasting, which will be done during operation. It is the city's policy to operate the road as a common carrier. More than 230,000 tons of freight will be hauled eastward, consisting of construction equipment and materials for the Hetch-Hetchy dam and the upper division of the tunnel aqueduct. The heaviest traffic will occur in 1919, when, it is figured, an average of 320 tons a day will be hauled for the city. The railroad passes through forests of large extent, which have not as yet been logged because of their remoteness from railroad transportation. It is expected that close to 2,000,000,000 board feet will be cut and marketed when the city provides adequate transportation facilities. The revenue from hauling this lumber will help in some measure to defray the cost. Beginning at Hetch-Hetchy Junction, a station on the Sierra Railway, twenty-six miles from Oakdale, the road runs almost easterly to Groveland, the headquarters of San Francisco for the Hetch-Hetchy work; thence it descends to the south and middle forks of the Tuolumne river, which are crossed on trestles, and finally ascends the Poopenaut pass, where an elevation of 5,064 feet is attained. From the summit the road descends on a 4 per cent. grade to Hetch-Hetchy dam site.

City Protests Against Water Report.

Meridian, Miss.—The city officials and citizens have been aroused to protest against an order recently issued by the United States Public Health Service to railroads forbidding the use of Meridian water. This "slur" against the purity of the local supply was hotly resented and denied. Mayor John M. Dabney gave out the following statement:

The mayor and commissioners have been, as calmly as possible, awaiting the discovery of the charges against the water supply of the city of Meridian since the embargo was placed upon the water for interstate use. The water department of the city of Meridian has throughout the years of municipal ownership improved each year the condition of the water supply. To undertake to estimate the degrees of advantage today over the degrees of advantage of five or ten years ago would, perhaps, be impossible. Throughout that time, however, it has been realized that the lack of control of the entire water shed has been undesirable. This has been realized by city officials in the past as at present; and, during Mr. Parker's administration under the commission form of government, an effort was made to begin to acquire this land, which failed because of petition against it. The change in the position of the public road by reason of the constructon of the new reservoir to the east side of the ponds was a mistake, but it was a mistake of the whole people. Mr. Worrell has contended for years that that road should not be there: and when army officials visited our city a few months ago this immediately caught their attention. It will be seen in the letter which is appended hereto that this is one of the points that the government contends for. Analyses of the city water have been for years made by Prof. James M. Caird, of Troy, N. Y., at stated intervals, and in June of the current year the analysis showed an excellent condition. This will show the absolute good faith of the water department in continuing to supply water to the city.

I have no comments to make on the seemingly arbitrary act of the Public Health Service in its method of dealing with us. The exigencies of the present war situation, perhaps, may necessitate an extreme scrupulousness that at other times might not be deemed necessary. I cannot refrain from remarking, however, on the strangeness of the assumption which we seem to be driven to, that there should be a difference between the value of the life of a man on an interstate railroad train and the value of the lives of the citizens of Meridian. Reasonably and justifiably, I am more jealous of their lives and happiness than I am of the world at large, but, in caring for my own people along this line, I should be caring for all who travel through Meridian, whether by rail or motor car. There-

fore, why, when the government saw fit to order the railroads to discontinue the use of our water, it did not at the same time advise the city of Meridian that it had done so, and at least hint to us that because of the fact it had felt that travelers should not drink it, it would advise us to so advise our citizens. I cannot understand. I am pleased to state that an order has gone for a chlorinating plant, which will be installed at once, pursuant to the recommendations in the letter from the Public Health Service. In conclusion, I state that thus far there is no worse condition in our water than possibility of future danger, as shown by government analysis. No typhoid is found.

In a letter by J. Holmes Smith, Jr., of the federal health service the reasons given for condemnation of the water supply are as follows:

1. The existence of a number of negro habitations along the water sheds of the several streams supplying the city of Meridian, several of these habitations being in such a position that a case of typhoid fever might readily be the cause of an epidemic in the city wherever the water was distributed.
2. Because of a public road passing directly through the before mentioned water shed, this road allowing the passage of all classes and characters of persons, vehicles, etc.
3. Because of some doubt as to the efficiency of the filtration plant in the city of Meridian, owing to the fact that the samples of water obtained came just within the limits prescribed as a bacteriological standard for drinking water supplied to common carriers engaged in interstate traffic.
4. Because the vital statistics of the city of Meridian are apparently very poorly kept and no definite idea could be obtained as to the location of certain cases of typhoid fever and other water borne diseases.
5. Because of the high rate of typhoid fever cases per one hundred thousand of the population.

The recommendations for the correction of these conditions are the following:

1. The abandonment of all habitations along the water sheds of the streams furnishing the water supply of the city of Meridian.
2. Closure to traffic of the roadway leading through water shed.
3. Installation of any necessary apparatus which will allow for the treatment of the water supply with liquid chlorine, this being considered about the most satisfactory and easiest method of treating same.
4. A routine bacteriological examination of the unfiltered and filtered water to determine the efficiency of the filters.

STREET LIGHTING AND POWER

Must Not Use Gas for Heating.

Indianapolis, Ind.—The Citizens Gas Company has issued a warning to all householders to discontinue the use of gas for heating purposes in cases where the gas heat is used as a substitute for heat from coal. The warning does not apply to gas for kitchen stoves, for hot water heating and for manufacturing purposes. J. D. Forrest, secretary and general manager of the company, said that the prohibition of the use of gas in grates and for heating purposes where coal should be used is not temporary, but will continue all the winter season. Mr. Forrest said the company now has a sufficient supply of coal on hand, but the fact that thousands of householders have neglected to put in their supply of coal for heating purposes and are using gas as a substitute has strained the plants of the company beyond their capacity. He said that on account of the extraordinary conditions now existing the capacity could not be increased before 1919, and at no time would the company be willing to provide gas as a substitute for coal heating. The company's statement gives the warning that consumers who continue to heat their houses with gas may be cut off from gas service. The gas supply for cooking purposes on several days has been so low that it was not sufficient in many parts of the city.

Public Service Commission Engineer Fined.

Los Angeles, Cal.—Within a few hours of the time set by superior judge Monroe for formally entering his findings in the contempt charges growing out of the legal battle between the city and the Los Angeles Gas and Electric Corporation over construction of power lines in Los Angeles, W. B. Mathews, counsel for the board of public service, filed an appeal in the case in the district court of appeals. Attorney Mathews applied to the district court for a writ of review from the judgment of judge Monroe in ordering E. F. Scattergood, chief electrical engineer of the public service commission, to pay a fine of $200 or serve 100 days in the county jail. The fine was based on a contempt charge of having failed to obey an order preventing the city from placing power lines along York boulevard close to those of the corporation. The appeal acted as a further stay of execution against the decision of judge Monroe. If the writ is granted by the state court, the legal contest as to the irregularity of the power corporation in its attempt to crowd the city lines from street probably will be reopened before the higher tribunal. The answer of the city to the latest attempt of the Los Angeles Gas and Electric Corporation to hinder the construction of the city power system was to purchase $237,000 worth of the power bonds with sinking fund money. The money thus obtained by the municipal power bureau will be used in futher extension of the municipal lines throughout the territory south of Exposition boulevard, where the gas corporation has had a monopoly of the electric business. The council voted to appropriate the money from the sinking fund to buy the aqueduct power bonds without delay. Mayor Woodman began signing the bonds immediately after a conference with W. B. Mathews, special counsel, and R. F. Del Valle, president of the public service commission. The mayor declared emphatically that by no means must the city let up in the fight to extend the city lines into the territory of the Los Angeles Gas and Electric Corporation, no matter what devices are resorted to to interfere with the city power project. "The $200 to pay engineer Scattergood's fine has been raised almost entirely in $1 subscriptions, many of the dollar checks coming from large corporations, as well as home-owners who sympathize with us in our fight," said president Del Valle.

Meters for Steam Heat.

Springfield, Ill.—Flat rates for heating service are to be withdrawn by the McKinley companies in various Illinois cities, and meter measurement systems installed as a result of a compromise agreed to here between representatives of the companies and patrons appearing before the state utilities commission. In effect the compromise is that the service shall be based on meter measurement, but the meter rate shall be so computed that it will result in the same bill as the flat rate. W. A. Shorb, chosen by the Decatur Association of Commercie to represent it was responsible for the compromise suggestion which temporarily at least halts the proceedings before the state utilities commission on the petition of the McKinley companies for permission to withdraw the flat rate for heating service and substitute the meter system of fixing the service fee. The question is to be left open for the approval of the state utilities commission until after the compromise has been given a fair test, perhaps during all of the winter season of 1918-9, when it will be approved by the state body. The company, if dissatisfied, may ask for an increase in rates or the patrons of the service may ask for a lower rate. Then the question will be on the cost of production and the service involved. Danville, Bloomington, Clinton, Champaign, Urbana, Galesburg and Decatur were represented at the hearing before the commission.

FIRE AND POLICE

Fire Alarm Contract Held Legal.

Plains, Pa.—An injunction brought by Mose Griffith against the Plains township commissioners and the Gamewell Fire Alarm Telegraph Company to ascertain whether the acceptance of the bid of the Gamewell Fire Alarm Telegraph Company by the township commissioners to install its system throughout the township and the awarding of the contract were fraudulent and should be declared null and void has been dismissed in an opinion by Judge O'Boyle. Griffith contended that the Gamewell Company did not submit the lowest bid and that the commissioners exceeded their authority in not awarding the contract to the Plains Electric Construction Company, the lowest bidders. In deciding the case against Griffith Judge O'Boyle says that "we cannot hold, after a careful investigation of the case, that the commissioners would be justified in awarding the contract to the company, of which the plaintiff was the sole member." In his opinion Judge O'Boyle

says: "It is fair to assume, and the evidence so shows, that immediately upon receipt of this bid, the committee discovered that the plaintiff in this case constituted the company, and further that he was never engaged in, nor had he any experience whatever in the installation of a fire alarm system; but on the other hand, was a real estate dealer, and the address which he gave, as some of the witnesses say, a dilapidated garage located on one of the streets in the township. It also appears from the evidence, that there was no one associated with him in the business when the bid was made out and presented to the commissioners. It also appears that there was no incorporated company, and that the name of 'Plains Electric Company' was called into being for the exigencies of the case. We have no hesitation in saying that the township officers were justified in selecting the Gamewell Company's bid in preference to the Plains Electric Construction Company, when they had before them the information that one hundred and fifty leading cities and towns, including Philadelphia and Pittsburgh, had already had this system in operation. It will be observed, upon examination, that the bid of the Plains Electric Construction Company permitted the institution of any fire alarm system, as its bid made no reference to the Gamewell system."

Firemen Join Union.

Yonkers, N. Y.—Members of the local fire bureau have made application for a charter of affiliation with the New York State Federation of Labor. The necessary signatures have been secured to the petition for a charter and, it is expected, the Yonkers firemen will shortly be recognized as members of the City Firemen's Union. It is said that the fire-fighting forces of 42 cities throughout the country, comprising a membership claimed to 3,000 men, are unionized. The sanction of the department heads has always been secured as the unionizing of men is for its moral influence. Under the rules of the Federation, firemen affiliated cannot take part in any strike or boycott and the question of salaries does not enter into the charter provisions.

Firemen Injured in Business Block Fire.

Bristol, Va.—What is said to have been probably the most disastrous fire in the history of Bristol wiped out four large buildings on Fourth street and caused a loss variously estimated at from $100,000 to $150,000. The blaze originated in the building occupied by the Reynolds Corporation and threatened to spread to the business district before it was gotten under control. Two men were injured and more than a dozen barely escaped with their lives when they were trapped on the upper floors and the roof of the building next door. They made their way to safety by clambering down ropes and hose hanging from the roof and the third and fourth story windows. Several firemen were injured. Each of the buildings was totally destroyed. The high brick walls at the Reynolds building and the other structures facing the street fell with resounding crashes to the street, littering a wide area with debris. Firemen narrowly escaped death time after time by falling brick and burning timbers. Several times their hose were burned under the falling walls when they were forced to retreat to the street for safety. It was conceded that the absence of a wind probably saved a large part of the business district from destruction. Members of the fire department say a high wind would have driven the flames to the nearby residences. In this event the firemen would have been utterly unable to cope with the situation, and the damage would probably have reached millions of dollars. The departments of both the Tennessee and the Virginia sides worked together.

Salary Increases for Firemen.

Duluth, Minn.—Salary raises for practically every member of the fire department have been provided for by the city council. The schedule of salaries has been revised following a number of conferences between the firemen and mayor Magney and commissioner Silberstein. No increase was given the chief or his two assistants. In the new schedule the rating of men has been changed somewhat. Lieutenants will now be rated above chauffeurs, some of whom up to this time have received the greater salary. In order to place lieutenants in their proper places, it was necessary to raise them from $92.50 to $102.50 per month. The secretary of the commission of public safety was raised from $30 to $35, but this includes only part of her salary, as she also occupies a similar position for the mayor at a higher salary. Most of the raises are of $5. The increase amounts to about $10,000 a year for the department. The old and new schedules follow:

		Old Salary.	New Salary.
1	Chief of department	$208.33	$208.33
1	First assistant chief	175.00	175.00
1	Second assistant chief	130.00	130.00
1	Secretary to commissioner	30.00	35.00
1	Fire warden	90.00	95.00
1	Supt. fire alarm	150.00	150.00
2	Engineers	95.00	100.00
9	Captains	100.00	105.00
10	Lieutenants	92.50	102.50
2	Stokers	90.00	95.00
11	Chauffeurs, 1 year	90.00	95.00
3	Chauffeurs 2 years	95.00	97.50
7	Chauffeurs 3 years	97.50	100.00
16	Pipemen-truckmen 1 year	75.00	80.00
29	Pipemen-truckmen 2 years	80.00	90.00
3	Pipemen-truckmen 3 years	85.00	92.50
35	Pipemen-truckmen 4 years	90.00	95.00
1	Watchman	25.00	25.00
1	Watchman, Dul. H	15.00	15.00
3	Telegraph operators	61.50	70.00
2	Blacksmiths	95.00	100.00
1	Master mechanic	115.00	120.00
1	Lineman	85.00	90.00
1	Lineman	95.00	100.00

GOVERNMENT AND FINANCE

Mayor Involved After Election Brawl Murder.

Philadelphia, Pa.—Mayor Thomas B. Smith, police lieutenant David Bennett and Isaac Deutsch, candidate for select council, are charged with conspiracy in connection with the killing of a special policeman and the assault on assistant district attorney John H. Maurer and Frank Carey, opponent of Deutsch for ward leadership. The murderous attacks took place during one of the many Republican faction fights in the so-called "Bloody Fifth" ward during the primary elections. Thugs and gunmen from New York have been arrested and it is said that they have made statements involving a Philadelphia detective. It is charged that they were led in the rioting by policemen and that they have been promised high pay and immunity for anything they did. These outrages have shocked the city and plans have been adopted for the organization of an independent party for the purpose of breaking the so-called "contractors' ring," the Vare-Smith combination.

Bond Issue Defeated by Indifference.

Columbus, Ga.—While a majority of the voters approved the proposition, the issue of $177,000 in bonds for a number of improvements was defeated because the necessary two-thirds of the registered voters did not come to the polls. Only 779 votes were cast out of the total registration of 1,221. Very little interest was taken in the election. Of the $177,000, the election held recently for the purpose of trying to secure bonds amounting to $177,000. Of this amount $150,000 was to be used in securing better sewerage connection; $15,000 for paying for the city hospital annex, and $12,000 for erecting a new fire station and other fire improvements. The votes recorded were as follows: For sewers, 491; against sewers, 276. For hospital, 589; against, 155. For fire station, 597; against, 146.

State Must Approve County Work Specifications.

Indianapolis, Ind.—Specifications for contracts for public work must be passed upon by the state board of accounts before the work may be awarded, according to a letter which has been sent out to all county auditors by G. H. Hendren, state examiner. The letter says: "In order that there may be no restriction of free and open competition in the letting of contracts for public buildings, bridges, gravel roads and drainage ditches, you are hereby requested to procure a set of duplicate plans and specifications of any such contemplated work and before advertising for bids send or cause to be sent a copy of the plans and specifications to this department for filing and inspection. When preparing plans and specifications a

sufficient number of copies should be made for the use of prospective bidders and the local and state authorities. Thus the duplicate copy furnished this department by the county surveyor, civil engineer, architect or heating engineer, will only be a trifle more expense. Such duplicate plans and specifications will be at all times open for public inspection of contractors and will thus greatly increase the competition which should reduce the cost of construction to the taxpayers. This department will provide for the examination of all plans and specifications submitted by competent architects, heating and ventilating engineers and civil engineers free of charge and report to you irregularities, if any, within five days. If irregularities are found in any such plans and specifications, a proper notation of such irregularities will be made and your architect, civil engineer or heating and ventilating engineer will then correct such irregularities before advertising for bids. If no irregularities are reported, you may proceed to advertise for bids as provided by law. A copy of the advertisement for bids should be filed with this department for the information of the public and prospective bidders."

State Civil Service Commissions.

Washington, D. C.—According to a new report issued by director Sam L. Rogers of the Bureau of the Census, entitled "Financial Statistics of States, 1916," eleven states—Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Ohio, Illinois, Wisconsin, Kansas, Colorado, and California—maintain civil service commissions. The expenditures in the eleven states for the support of these commissions aggregated $358,486; and the greatest expenditure made for this purpose by any one state, $89,009, was reported for New York.

STREET CLEANING AND REFUSE DISPOSAL

Conservation and Garbage Decrease.

Albany, N. Y.—That citizens in New York State are heeding the appeal to stop wasting food is indicated by reports received from the cities showing the amount of garbage collected this summer and in 1916. According to a report made public by W. P. Capes, director of the State Bureau of Municipal Information, there has been a decided falling off this year in the amount of garbage collected in the cities of New York state which keep collection records. Only two of those reporting show an increase, caused probably by more efficient methods of collection having been introduced during the year. Comparisons were made by the bureau for the State Food Commission, the collections for June and July of this year and those in the corresponding months in 1916 being used. Following are some of the June decreases reported: Rochester, 693 tons; Manhattan, Bronx and Brooklyn, 5,953 cubic yards; Kingston, 20 tons; Cortland, 6 tons; New Rochelle, 666 cubic yards; Syracuse, 38 tons; Albany, 668 barrels; Utica, 5 tons daily; Buffalo, 1,069 tons.

New Garbage Collection Contract.

Flint, Mich.—In an attempt to get better service from the United Disposal & Recovery Company, which has secured a contract with the city to collect and remove garbage, a new contract drawn up by the city attorney has been adopted by the common council. The new contract, which is to remain in effect for 20 years, with the exception that the city reserves the option of the purchase of the entire disposal plant at the end of the first 10-year period, states in detail the service which is expected of the disposal company. Under the contract the company is required to construct not later than May 1, 1918, a modern, sanitary garbage disposal plant on a site which will be furnished by the city. The site for the disposal plant designated in the contract is located in Burton township and contains 8 acres. The city gives the site to the disposal company for the term of the contract, together with the railroad siding and other buildings that are already erected, and provides that the disposal company shall pay taxes on the property for the term of the contract. The clauses of the contract which govern the collection of the garbage provide that the disposal company "shall collect the garbage every day except Sundays from all hotels, hospitals, fish stores, stands, restaurants, fruit and grocery stores and eating houses; and once each week from all residences of the city during the months of November, December, January, February, March, April and until May 15 and twice each week from May 15 during the months of June, July, August, September and October." The contract also reserves the right to the city to require the collection of the garbage from residences as often as twice each week during the months of April, May and other summer months, if the sanitary conditions require it; the city to pay extra compensation for this extra service. The city agrees in the contract to pay the disposal company $25,000 per year for collecting the garbage, so long as the terms of the contract are complied with. The only clause of the contract which met with objection by some members of the council was a clause which states that the disposal company will not be required to collect garbage on unimproved street or streets made impassable by city improvement construction, and gave the city health officer the power to determine when a street is impassable.

Waste Paper Collection in Scotch City.

Edinburgh, Scotland.—In the year ended May 15, 1917, the revenue of Edinburgh's cleansing department from waste paper collected and sold was £2,214 ($10,775), and the receipts from this source are largely increasing. During the two months to July 15, 1917, the quantity of paper sold was 129½ tons, giving a return of £1,206 ($5,870). There is no debit side to the account, as the revenue is derived from the essential municipal operations of cleaning and sanitation. The inspector of lighting and cleansing has made the following statement concerning the organization in his department for the collection and disposal of waste paper: "Previous to the spring of 1914 this department's interest in the collection of paper was confined to providing a local philanthropic agency with the free use of two vans with horses and drivers. About this time there was considerable trouble owing to loose papers being blown by the wind in the vicinity of the dumps in the country where the city's refuse is deposited, and in order to mitigate this nuisance steps were at once taken to recover as much as possible of this paper at the railway sidings where the refuse was loaded. These measures were followed by arrangements for withdrawing the two vans and establishing a direct collection of waste paper managed by the department. This came into operation in May, 1914. The general idea was to reach the citizens who put out papers with their refuse, to provide bags free of charge, and to visit every street on fixed days. A place was selected as headquarters and, a stack of bags having been procured, supplies were issued to the scavenging overseers, who report the addresses of citizens who agree to keep a bag on their premises. The carts removing the morning refuse are each provided with a bag in which books and papers (which are readily recoverable from the refuse) can be deposited, and this material is quite salable when the dust has been shaken out. The bags found most suitable for supplying to the public were hessian, and secondhand sugar and rice bags were readily obtainable before the war at 4d. and 4½d. (8 and 9 cents) each. A fair proportion of bags has also been salved from the refuse. Up to November, 1915, the paper was sold under contract in the condition collected, but from that date the department has undertaken the sorting as well. This is performed by female labor, 12 women on an average being employed, while two men with two hand-operated machines press the material into bales after it has been sorted. Instead of the two collecting vans employed in May, 1914, there are now six engaged in this work, and the number of bags lent out has increased to over 8,000. Each van is worked by the driver and two girls. The runs are made up on a loose-leaf system, and a record is available at all times of the addresses where our bags are in use and the number at each address. The bags taken out and brought in are tallied each day and losses are found to be practically negligible."

NEWS OF THE SOCIETIES

Calendar of Meetings.

Sept. 24-28.—CALIFORNIA CONFERENCE ON CITY PLANNING. Annual conference, Santa Rosa, Cal. Secretary, Charles H. Cheney, Crocker Building, San Francisco, Cal.

Sept. 24-29.—LEAGUE OF CALIFORNIA MUNICIPALITIES. Annual convention, Santa Rosa, Cal. Secretary, Wm. J. Locke, Pacific Building, San Francisco, Cal.

Sept. 24-29.—THIRD NATIONAL EXPOSITION OF CHEMICAL INDUSTRIES. Exposition, Grand Central Palace, New York City.

Sept. 25-27.—SMOKE PREVENTION ASSOCIATION. Annual convention, Columbus, O. Secretary, Frank A. Chambers, City Hall, Chicago, Ill.

Sept. 25-27.—LEAGUE OF WISCONSIN MUNICIPALITIES. Annual convention, Racine, Wis. Secretary, Ford H. MacGregor, Madison, Wis.

Sept. 27, 28.—CANADIAN PUBLIC HEALTH ASSOCIATION. Annual congress, Ottawa, Ont. Secretary, J. G. Fitzgerald, M. B., Toronto, Ont.

Sept. 27-29.—AMERICAN AND CANADIAN ENGINEERS AND ARCHITECTS OF NORWEGIAN BIRTH OR DESCENT. Informal congress and re-union, Chicago Norske Klub, Chicago, Ill. Chairman, Committee on Arrangements, Joachim G. Giaver, consulting engineer, Chicago, Ill.

Oct. 10.—UNION OF BRITISH COLUMBIA MUNICIPALITIES. Annual convention, Duncan, B. C. Secretary, Ex-Reeve H. Bose, Survey Center, B. C.

Oct. 15-17.—NATIONAL HOUSING ASSOCIATION. Annual conference, Hotel La Salle, Chicago, Ill. Secretary, Lawrence Veiller, 105 East 22d St., New York City.

Oct. 15-17.—NATIONAL ASSOCIATION FOR STUDY AND PREVENTION OF INFANT MORTALITY. Annual meeting, Richmond, Va. Secretary, Gertrude B. Knipp, 1211 Cathedral street, Baltimore, Md.

Oct. 16-19.—LEAGUE OF KANSAS MUNICIPALITIES. Annual convention, Wichita, Kan. Secretary, Homer Talbot, University of Kansas, Lawrence, Kan.

Oct. 17-18.—LEAGUE OF MINNESOTA MUNICIPALITIES. Fifth annual convention, St. Cloud, Minn. Secretary-treasurer, Richard R. Price, University of Minnesota, Minneapolis.

Oct. 17-19.—AMERICAN PUBLIC HEALTH ASSOCIATION. Annual meeting, Washington, D. C. Acting Secretary, A. W. Hedrick, 126 Massachusetts Avenue, Boston, Mass.

Oct. 22-24.—AMERICAN CIVIC ASSOCIATION. Annual meeting, St. Louis, Mo. Secretary, Richard B. Watrous, 914 Union Trust building, Washington, D. C.

Oct. 28-30.—TEXAS CONFERENCE ON SOCIAL WELFARE. Annual convention, Houston, Texas.

Nov. 19-24.—CITY MANAGERS' ASSOCIATION. Annual meeting, Detroit, Mich. Secretary, W. L. Miller, City Manager, St. Augustine, Fla.

Nov. 20-21.—ASSOCIATION OF GOVERNMENTAL RESEARCH AGENCIES. Third annnal meeting, Detroit, Mich. Secretary, C. O. Dustin, Statistical Bureau, Red Cross War Council, Washington, D. C.

Nov. 20-23.—PLAYGROUND AND RECREATION ASSOCIATION OF AMERICA. Recreation Congress. Secretary, H. S. Brancher, 1 Madison Ave., New York, N. Y.

Nov. 21-24.—NATIONAL MUNICIPAL LEAGUE. Twenty-third annual meeting, Hotel Statler, Detroit, Mich. Secretary, Clinton Rogers Woodruff, 703 North American Bldg., Philadelphia, Pa.

Jan. 15-17.—VIRGINIA GOOD ROADS ASSOCIATION. Seventh annual convention, Richmond, Va. Secretary, C. B. Scott, Richmond, Va.

Feb. 6-13.—FIRST CHICAGO CEMENT MACHINERY AND BUILDING SHOW. Supersedes annual Chicago Cement Show. Held at the Coliseum, under direction of the National Exhibition Co.

March 17-24.—PAN-AMERICAN CONGRESS ON CHILD WELFARE, Montevideo, Uruguay. Secretary, Edward N. Clopper, 105 East 22d Street, New York, N. Y.

American Association of Engineers

The board of directors of the American Association of Engineers, at their meeting on September 5, granted charters to the members in St. Paul, Indianapolis and Milwaukee. This makes a total of seven chapters which have been organized since the association was incorporated about two years ago. The total enrollment of the national organization is over twenty-two hundred members.

A joint meeting of the association and the Detroit Engineering Society was held in the Commerce Building, Thursday, August 30. It was the unanimous opinion of the engineers present that the Detroit society should form a working co-operation with the American association, as they have been carrying out a similar program locally for Detroit as the other organization has operated in a national way. The Detroit society has a total enrollment of about 700 members, and if this working co-operation is established it will mean the furthering of the work laid out by the Committee on Engineering Co-operation.

Membership in the American Association of Engineers is being extended to all technical engineers in military service without payment of initiation fee or dues. This is part of the co-operative plan to keep them advised as to progress in the engineering field and to give them personal assistance upon their return to their professional work.

American Academy of Political and Social Science.

The country-wide expectancy in meeting the biggest problem of the war, conservation of agricultural and live stock resources, was described by national experts at the world's food conference of the American Academy of Political and Social Science, which convened in the assembly room of the Philadelphia Chamber of Commerce September 15.

"If we are to have more milk the consumer must learn to pay for it," W. H. Jordan, director of the New York State Agricultural Experimental Station, who presided at the afternoon conference, said, explaining: "This is the only solution to the milk problem. In some parts of the country milk cannot be produced at the present prices. Milk is the most eco-economical food that can be used in the family, and because of its highly nutritious qualities the consumer can well afford to pay more for it. Milk is not a luxury, as it has been regarded, but the best animal food."

Charles Lathrop Pack, president of the National Emergency Food Garden Commission, through whose activities since last February hundreds of thousands of "war farms" have been established in every city, town and hamlet of the country, said that through this form of intensive cultivation the nation's food supply has been increased to the extent of more than $350,000,000. Next year we will do even better. He continued: "We will then have more war gardens and the average product of each will be larger. There is much evidence that our food gardens are helping our people to feed themselves more reasonably.

"The results will mean much for food this winter f. o. b. the pantry shelves of the homes of America and help us by feeding ourselves to feed our boys of the army and navy and our Allies. The canning and drying movement has brought back to thousands of American households an art almost forgotten since our grandmothers' day."

The Mayor's Food Commission and the Chamber of Commerce were assailed by Mrs. N. D. Hitchcock, instructor in marketing, Temple University. She said: "If these experts with all their information and training would put their minds on this food question and get to work the housewives would be relieved of their greatest difficulties in obtaining food. They should get busy and provide better facilities for the transportation of food into the city and to and from the various markets. It is the duty of the city, as well as the state and nation, to put the food where the women can get it. It has passed the women to bring it to the city or markets.

"Our markets do not compare favorably with those of European cities. Our food terminals are inadequate. Too much time is lost in hauling the food from the stations to the markets and back again, thus increasing its cost. Food cannot be hauled without shrinkage and damage. Wholesalers, retailers and all others handling food must conserve it. Food speculation should be treated as a crime the same as treason, and I want every woman here to join me in urging that this be adopted.

"We are putting too much of a tax on the women, and they have not the training for handling this problem. The schools have done good work, but have failed to give adequate training in practical and simple home economics. Every girl of fourteen years should be able to select food and cook it, and cook it well. It is not that our girls cannot do this but because we have not taught them to do it. Co-operation is what we need in every phase of the problem, and that is what we are coming to."

National Safety Council.

The Sixth Annual Safety Congress was recently held at the Hotel Astor, New York City, on September 11 to 14. At the same time a big exposition of safety and sanitation was shown at the Grand Central Palace, which drew large crowds.

The work of the council was divided into general round-table discussions, general sessions and sectional meetings. In the sections of the council the following divisions were included:

"Industrial," "Transportation and Public Service," "Health and Industrial Relations," "Public Administration" and "Public Safety." Among the committees which presented important reports were those on safe practices, industrial preparedness, statistics of industrial accidents and hygiene, danger emblem and fire prevention.

At the general session held Wednesday morning, at which President L. R. Palmer of the Council was chairman, the following addresses were made: "Economic and Social Value of Accident Prevention," by Dr. Charles P. Steinmetz; and "Progress and Possibilities of Accident Prevention Work," by M. A. Dow, of the New York Central lines. The opening address was made by Hon. William B. Wilson, Secretary of Labor, Washington.

The chemical section meeting, of which the chairman is J. R. de la Torre Bueno, of the General Chemical Company, discussed many phases of the safe handling of various chemicals.

The health service section meetings received reports from a number of committees, including those on standard forms, health insurance, medical work and interpretation and evaluation. Miss Ida M. Tarbell gave an address on "Health for Every Man." Other papers presented before the meetings of this section included "Health Instructions," Dr. C. E. Ford; "Conservation of the Health and Safety of the Worker During War," Dr. Harry E. Mock; "Sanitary Standards in Industry," Dr. T. A. Cousins; "Occupational Diseases and Their Elimination from the Industries," Dr. Alice Hamilton, of the U. S. Bureau of Labor; and "Employment, Examination and Medical Supervision," Dr. T. E. Mead. "The Need for Visiting Nurses in Industry" was presented by Miss Ella P. Crandall, of the National Organization for Public Health Nursing.

At a dinner held Wednesday night, the speakers were Hon. William C. Redfield, Department of Commerce, Washington; George F. Vincent; Job Hedges; and John Mitchell.

On Thursday morning a general session was held, at which, among others, papers on "Duties of the Safety Engineer," by David Van Schaak; "How to Organize for Safety," by C. W. Price; and "Educational Activities in the Safety Field," by Earl B. Norton, were presented.

At two meetings of the electric railway section the following were presented: "Prevention of Accidents Between Street Cars and Automobiles," by T. I. Hardy, general manager Chicago, South Bend & Northern Indiana R. R. Co.; and "Co-operation Between the Claim Department and the Transportation Department."

The public utilities section heard the following papers: "Safety Practices in Telephone Work," by John F. Naylon; "Safety Work in Gas Companies," by Edward L. Davis, Queensborough Gas & Electric Co., New York; "Safety Work as It Applies to Electric Generating and Substations," by H. J. Burton, Consumers' Power Co., Jackson, Miss.; and "Accident Prevention in the Electrical Field," W. C. Pearce, Syracuse (N. Y.) Lighting Co.

On Friday morning at a round-table

(Continued on page 322.)

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

STREET IMPROVEMENTS are to be made by Frankfort Heights, Ill. The engineer for the work is P. B. Wilson, Marion, Ill.

Normal, Ill., is making SEWER IMPROVEMENTS. The designing engineers are Melluish & Broyhill, Unity building, Bloomington, Ill.

A WATER STORAGE BASIN is to be built by Atlantic, Ia. Plans are in preparation by J. H. Mayne, 235 Merriam building, Council Bluffs, Ia.

SEWERAGE IMPROVEMENTS are to be made by Holdrege, Neb. The engineers are Grant & Fulton, 505 Bankers Life building, Lincoln Neb.

A number of improvements are to be made at the WATERWORKS of St. Paul, Minn. The consulting engineer for the work is J. F. Druar, 314 Commercial Building, St. Paul, Minn.

A CITY PLAN and ROADS and other improvements are proposed for Rockford, Ill. The architects and engineers for the work are the American Park Builders, 140 S. Dearborn street, Chicago, Ill.

Extensive improvements are proposed on the WATER SUPPLY SYSTEM of Springfield, Ohio. City Manager Ashburner has called into consultation to report on the situation Allen Hazen, of Hazen, Whipple & Fuller, 30 East 42d street, New York, N. Y.

A $60,000 bond issue has been voted for the improvement of the HIGHWAYS of Crosby County, Tex. The work was designed and planned by the consulting engineer, Henry Exall Elrod, Interurban Building, Dallas, Tex.

Cleveland, Ohio, is to build a $2,500,000 AUDITORIUM and CONVENTION HALL. The consulting architects for this project are Walker & Weeks, 1900 Euclid Building, Cleveland.

A new BRIDGE is to be built by Camden County, St. Mary's, Ga. The consulting engineer for the proposed structure is William M. Torrance, 129 Bull street, Savannah, Ga.

Harrisburg, Pa., is planning to increase its WATER SUPPLY. A report on the necessary improvements has been submitted by the consulting engineer, F. H. Shaw, Breneman Building, Lancaster, Pa.

Bids are soon to be received by the city of Carbondale, Pa., for the construction of SEWERS and DISPOSAL WORKS, the latter to cost $60,000. The consulting engineer for the proposed improvements was Clyde Potts, 30 Church street, New York, N. Y.

SEWERS and a SEWAGE DISPOSAL PLANT are to be built by Ada, Okla. The preparation of plans and specifications for the projected improvements has been in the hands of the consulting engineers, The Benham Engineering Co., Colcord Building, Oklahoma City, Okla.

PERSONALS

Coghlan, B. K., has resigned as associate professor of highway engineering at the Agricultural and Mechanical College of Texas. He is captain in the Engineer Officers' Reserve Corps and has been ordered to Ft. Leavenworth.

Gear, J. T., recently city engineer of Kelso, Wash., has been appointed city engineer of Puyallup, Wash. This office has been vacant since April, when City Engineer Ball resigned. Before taking up engineering Mr. Gear was a banker.

Hazlehurst, James Nisbet, has resigned as chairman of the board of consulting engineers of the city of Atlanta and from the chairmanship of the executive committee of the affiliated technical societies of the city of Atlanta and the state of Georgia to take up military duties. Mr. Hazlehurst will leave at once for service with the expeditionary forces in France.

Medley, William H., chief of police of Fall River, Mass., died September 16 from injuries received in an automobile accident.

Palmer, W. K., who for sixteen years past has been continouusly engaged in consulting engineering practice, and the head of the firm of The W. K. Palmer Company, engineers, Kansas City, Mo., has accepted a commission as major in the Engineer Corps of the U. S. Army. In consequence, his practice and the business of The W. K. Palmer Company has been discontinued for the period of the war. Mail can be addressed to the old number, however, and forwarded in due course, but no new business will be undertaken or accepted. Major Palmer organized engineer troops at the beginning of the war and has been actively engaged in military matters for some time past.

Wiley, John, has resigned as captain of the Salem (Mass.) fire department to go in business.

Young, Robert K., state public service commissioner of Pennsylvania and former state treasurer, died at Wellsboro, September 12, from an accident sustained in June of this year.

NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

WALKER ELECTRIC VEHICLES.

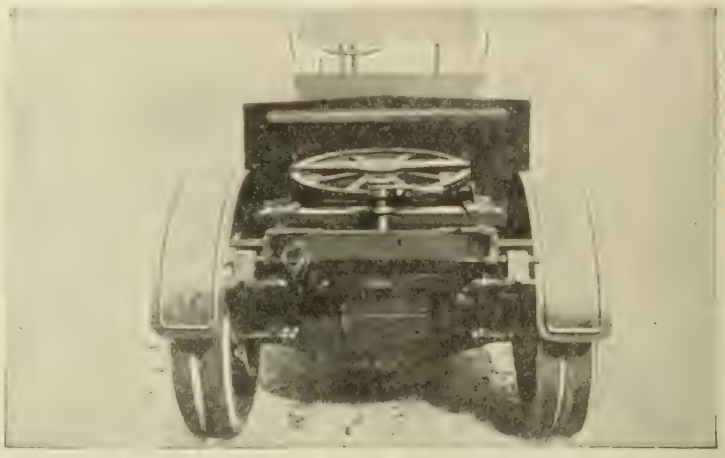
With Special Balance Drive Feature.

The outstanding feature of the Walker electric vehicle is the balance drive. To this is attributed the high and permanent efficiency of operation, due to the simple design, permanent alignment and balance of the working parts. The drive is all housed in the hollow rear axle and hollow rear wheels and consists of only the following ten parts, all rotating. The electric motor is located in the hollow torpedo-shaped rear axle. The differential is direct connected to one end of the hollow armature shaft. The two draft shafts extend from the differential sockets into the center of each hollow rear wheel, with a pinion on the wheel end of each shaft. Two idler gears are in each wheel, mounted on the stub-axle yoke arms. The rim gears are fastened to the inside of the tire rims. The motor and direct-connected differential drive the shafts, the pinions of which drive the wheels by means of the idler and rim gears.

The single motor is of the series type, of ample capacity and fully inclosed. The armature shaft is of large diameter and hollow, and mounted on extra large ball bearings. The motor is designed for maximum efficiency under variable load conditions. It is easily accessible. Sixty-volt motors are furnished for operation with Edison batteries, and eighty-volt motors for lead batteries. The differential is self-contained, direct-connected bevel gear type, with case bolted to flange integral with the hollow armature shaft.

Speed control is through improved continuous torque drum type controller, giving five speeds ahead and five reverse, located under the seat and instantly accessible. The control handle is operated conveniently by driver's left hand. Steering is by means of an improved wheel steering mechanism located on left-hand side. There are two sets of brakes, large contracting and also expanding types, both on rear wheels.

The front axle is high-grade steel drop forging I-beam section with drop forged steering knuckles and arms. The steering knuckles are mounted on Timken roller bearings. The rear axle, containing the drive, is a hollow steel torpedo-shaped tubular section. The front wheels are steel disc wheels mounted on Timken roller bearings, specially designed for attractive appearance and strength. The rear wheels are also steel discs, with radial corrugations in the form of spokes inclosing the drive gears. They are dirt and water proof. They are partly filled with lubricant, which is distributed continuously over all working parts. These wheels are mounted on roller bearings and supported by stub axles secured into the ends of the hollow rear axle.



WALKER ELECTRIC TRACTOR (SHOWING FIFTH WHEEL)

The chassis frame is of improved design, all steel, channel section. The frame is provided with truss rods and has a steel bumper in front. The springs are semi-elliptic front and rear; heat treated chrome-vanadium steel. The wheel gauge is 56 and 62 inches. The wheel base varies to suit length of body back of seat required by loading space needs.

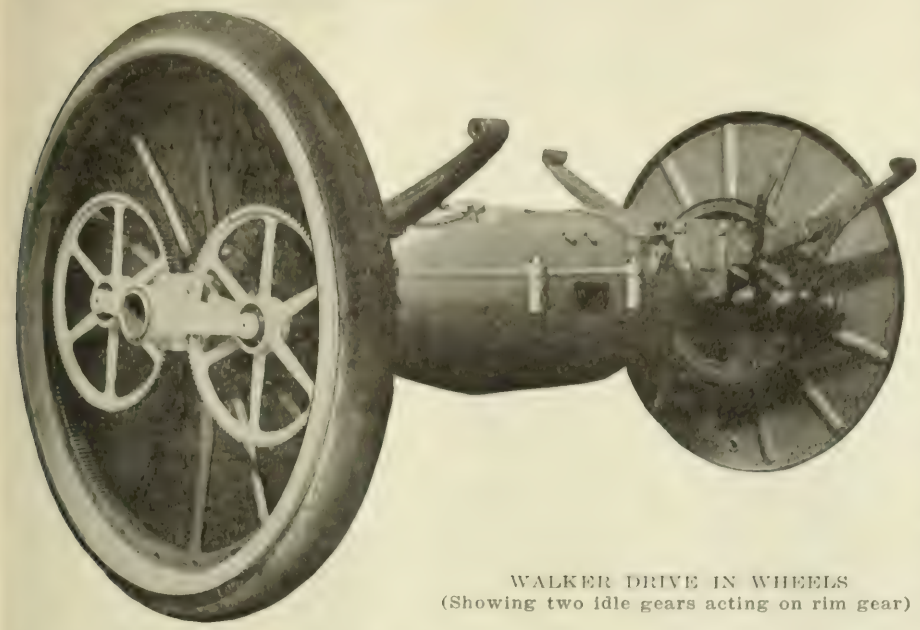
The batteries are furnished of a type best suited for the particular service. The mileage capacity per charge of battery is calculated to be ample for service requirements. The maximum speed is 15 to 10 miles per hour.

The vehicle described is made in six capacities—1,000, 2,000, 4,000, 6,000, 8,000 and 10,000 pounds. Tractors are also built to suit service conditions, with capacities up to 15 tons gross trailing load. Bodies are made in any type for all kinds of service, such as for municipalities, public utility corporations and contractors. One interesting example is a 5-ton chassis with a standard 6-yard side-dump Lee body.

The accompanying illustrations show two views of the drive mechanism, a rear view of the five-wheel type tractor and a model L 2-ton Walker,

2-TON WALKER ELECTRIC OPERATED BY CITY OF CHICAGO

equipped with special compartment body for overhead line construction, owned and operated by the depart-



WALKER DRIVE IN WHEELS
(Showing two idle gears acting on rim gear)

ment of gas and electricity of Chicago.

This vehicle is made by the Walker Electric Vehicle Company, 531-545 West 39th Street, Chicago, Ill.

CHIPPING HAMMER AND AIR DRILL.

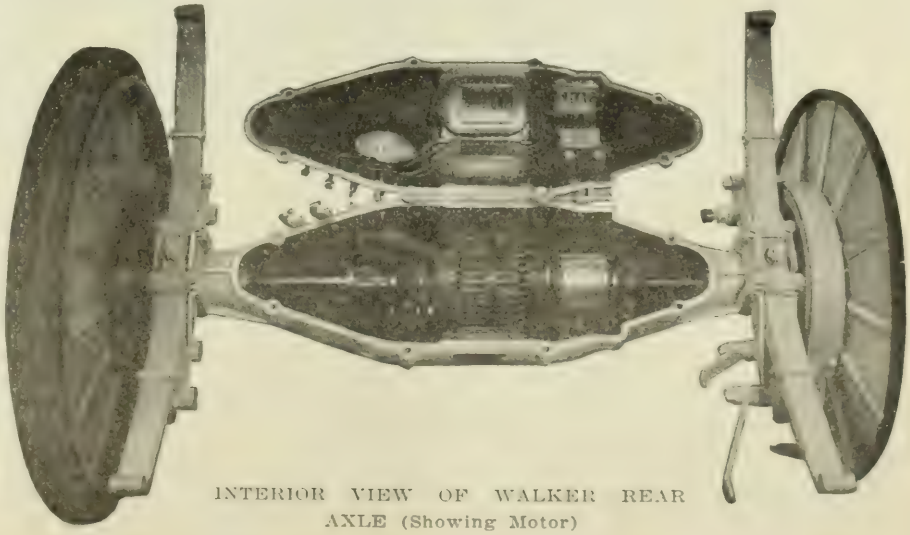
Compressed Air Tools Found Economical by Contractors.

As recently described in Municipal Journal, the department of public works of Baltimore, Md., has found the use of a chipping hammer, operated by compressed air, very economical for toothing out granite block and vitrified brick pavements when making repairs to cuts. Two size B, No. 2 Thor chipping hammers were used, and the average day's work was 300 lineal feet of toothing, at $6.79 per day, or 2.26 cents per foot. Previous to the purchase of these hammers stone masons were employed by the city who did about 26 lineal feet of toothing in an average day's work, at $4.50 per day, or about 18 cents a foot. This type of hammer is also used to cut down the edges in brick paving work.

The new Thor single-valve chipping hammer is equipped with a new type of valve mechanism. The valve block consists of two solid cylindrical parts hardened and ground to fit. The valve is a cylindrical shell (hardened and ground) placed on the outside of the valve block, with the wearing surface covering practically the entire block. The handle affords complete protection to the valve. The wearing surface of the valve is claimed to be many times larger in proportion to its weight than in any other hammer. This construction allows for extra large inlet and exhaust ports, and the large area for shifting the valve moves it with extreme precision with relation to the travel of the piston. This hammer is made in sizes from 1 to 5 inch stroke, with piston diameter of 1-1/16 inches. The size B hammer has a 2-inch stroke, works on 13 cubic feet of free air per minute and gives 2,200 blows per minute. It weighs 9 pounds and has an overall length of 13 inches. The cut on the next page shows a size B hammer with retainer.

Roller bearing piston air drills, a cross-section of which is shown in the other illustration, are claimed to have an actual increase in power over the plain bearing type of at least 25 per cent. In addition, the Corliss valves, telescopic screw-feed and removable crank chamber plate insure operating economy. These features allow also for a longer range in drilling and give easy access to the inside working parts.

These are two examples of a comprehensive line of compressed air tools made by the Independent Pneumatic Tool Company, Thor Building, Chicago, Ill.



INTERIOR VIEW OF WALKER REAR AXLE (Showing Motor)

INDUSTRIAL NEWS

Cast-Iron Pipe.—It is expected that the recent price regulation of iron ore, pig and finished products will have an effect of lowering prices very soon. Quotations: Chicago, 4-inch Class B and heavier, $68.50; 6-inch, $65.50. New York, 4-inch, Class B and heavier, $68.50; 6-inch, $65.50. Birmingham, 4-inch, Class B and heavier, $63; 6-inch, $60; Class A, $1 extra.

The Duplex Truck Company, Lansing, Mich., through its secretary and treasurer, George W. Hewitt, has given out the following statement: "With our new factory buildings completed in November and machinery installed by the first of the year, our production of heavy haulage trucks will be increased to about 300 monthly during 1918. The value of Duplex trucks to be manufactured during 1918 will total $12,960,000, or about ten times the value of our 1917 production. Our new factory buildings will give us about 100,000 square feet of additional floor space—one of the buildings being 402 by 72 feet, and the other 306 by 72 feet. Both are two-story structures."

The Asbestos Protected Metal Company, Pittsburgh, Pa., is very proud of the patriotism displayed by its personnel. Up to date the honor roll of the company includes: Stuart S. Caves, formerly in engineering dept., Officers' Reserve at Ft. Niagara. F. C. Easterby, formerly district representative at St. Louis, constructive quartermaster Ft. Riley, Kas. W. C. Fanning, formerly in engineering dept., Officers' Reserve, Ft. Niagara. Wm. H. Hale, formerly district representative at Minneapolis, Minn., has completed training, Officers' Reserve. E. G. Irwin, formerly district representative at Cincinnati, O., now somewhere in the south with Ohio National Guard regiment. J. R. Nichols, formerly district representative at Atlanta, Ga., now Captain of Field Artillery. Walter A. Slingluff, formerly in skylight dept., enlisted with Pittsburgh regiment of engineers and now somewhere in France. John

B. Williamson, formerly in erection department. Commissioned First Lieutenant of Engineers and now in Washington. P. J. Young, formerly chief engineer, commissioned First Lieutenant of Engineers and now somewhere in France. T. R. Galey, formerly district representative at Dallas, Tex., Officers' Reserve, Leon Springs, Texas.

Catalogs for Foreign Commerce.

The Bureau of Foreign and Domestic Commerce desires to obtain a collection of trade catalogs published in the United States and in foreign countries. So far as possible bound catalogs are desired, or at least the more substantial unbound catalogs. Casual catalogs, folders, circulars and the like are not wanted. It is especially requested that catalogs issued in foreign languages by American concerns be supplied. When new editions are issued the latest copy should be sent to the bureau, so that the collection may be kept up to date from year to year. It is requested that the catalogs be advanced to "Bureau of Foreign and Domestic Commerce, Research Section, Washington, D. C." The following list enumerates some of the classes of catalogs that will be included in the collection: Automobiles, truck, motorcycles, and parts and accessories; chemicals; construction materials, including cement, iron and steel, lumber, etc.; implements and tools; India rubber, gutta-percha, and substitutes for and manufactures therefrom; machinery, including all lines, such as agricultural, dredging, engines (gas, gasoline, steam, etc., of all kinds), general mining, pumps, etc.; oils; paints and varnishes; scientific instruments; vehicles, including automobiles, carriages, cars, etc.

NEWS OF THE SOCIETIES

(*Continued from page* 319.)

discussion, under the chairmanship of R. W. Campbell, was held on the topic: "Practical Methods for Organizing Public Safety in Cities."

The exhibition at the Grand Central Palace was an interesting feature of the conference. Moving pictures to bring home the lessons of safety were attended by crowds. The exhibits included safety devices of all kinds, the work of the New York City fire department and the National Red Cross, insurance companies and large public service corporations. One of the most instructive and carefully prepared exhibits was that of the Prudential Life Insurance Company, Newark, N. J.

American Public Health Association.

"War and Health" will be the central theme at the meeting of the American Public Health Association at Washington, D. C., October 17-20. Some of the speakers on these subjects will be Surgeon General Gorgas, U. S. A.; Surgeon General Braisted, U. S. N.; Colonel T. H. Goodwin, of the English Army; Assistant Surgeon General J. W. Trask, U. S. P. H. S., and representatives of the French and Canadian sanitary bureaus.

Each of the seven sections of the association will have a conference on health problems and opportunities of the war, and a symposium on this subject will be given at one of the general sessions by committees from each section.

Mayors, boards of health, and others interested in sanitary science all over the country are invited to be present or to send representatives to the war meeting. The association emphasizes the necessity of obtaining hotel accommodations well in advance, as Washington will be crowded. Nonmembers are welcome.

The complete program has not yet been published but will appear in the October number of the American Journal of Public Health, to be published shortly before October 5. Separate programs may be had by addressing the acting secretary at 126 Massachusetts avenue, Boston, Mass.

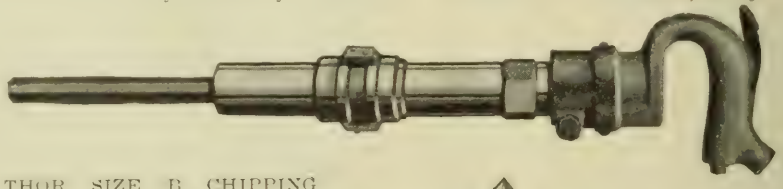
Although a large part of the meeting will be devoted to health problems of the war, about half of the papers will be of a non-military nature.

Following is a partial list of the papers to be presented:

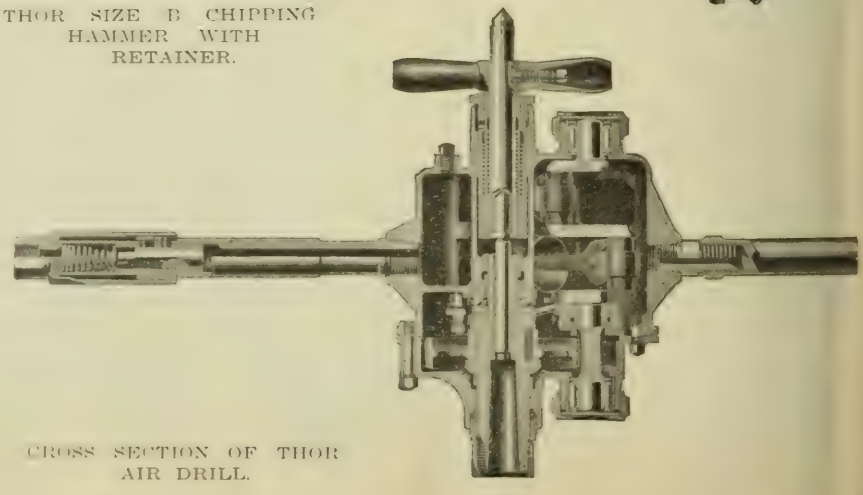
Presidential address by W. A. Evans, M. D.; and addresses by Surgeon-general W. C. Gorgas, U. S. A.; Surgeon-general W. C. Braisted, U. S. N.; Assistant Surgeon-general J. W. Trask, U. S. P. H. S.; Col. T. H. Goodwin, of the English Army; Franklin H. Martin, M. D., National Council of Defense; Herbert C. Hoover (or a representative), director U. S. Food Administration. "War and Mental Diseases," Major Pearce Bailey, U. S. A. "Tuberculosis and the War." Dr. Herman M. Biggs, State Health Commissioner, Albany, N. Y. "Report of Committee on Venereal Diseases," Dr. W. F. Snow, member Advisory Council of Defense. Symposium, "Venereal Disease Control in the Army and Navy." "Rehabilitation of Injured and Crippled Due to the War," Major Joel E. Goldthwaite, M. R. C. Chairman's address, "Some Public Health Problems of the Present War," Dr. E. C. Levy, chairman Public Health Administration Section. Chairman's address, "The Service of Health Laboratories in Time of War," Dr. Henry Albert, chairman Laboratory Section. "Sanitation of Barracks and Surrounding Zones," speaker to be announced. "Role of the Local Health Officer in National Defense," speaker to be announced. "Notification of Diseases and Protection of Troops," A. J. Chesley, M. D., Minneapolis, Minn. "General Measures for the Prevention and Control of Industrial Diseases in Time of War," Dr. Alfred Stengel. "Need for Sanitary Supervision of Industries in Time of War," Dr. E. R. Hayhurst, Columbus, Ohio. "Practical Points in the Safe Handling of T N T and Allied Explosives," Dr. G. W. Hudson. "Replacement of Men by Women in War Industries," Josephine Goldmark or Ida Tarbell. "Industrial Fatigue—Its Relation to War Industries," Prof. Frederic S. Lee. "War Activities of the Bacteriological Laboratories in France and England," Dr. William H. Park, Director of Research Laboratories, New York City. "Canadian Laboratories in War Service," Dr. Nasmith, Director of Laboratories, Toronto, Ontario.

New York Patrolmen's Protective Association

At the annual convention held at Rensselaer, N. Y., Sept. 5 and 6, the association re-elected Thomas P. Dolan of Albany to the presidency of the order. The other officers elected are: First vice president, William A. Barney, Rensselaer; second vice president, James V. Connelly, Kingston; third vice president, Frederick Greenough, Schenectady; secretary, Edward P. McMahon, Syracuse; treasurer, Richard J. O'Brien, Albany; auditor William H. Redmond, Troy.



THOR SIZE B CHIPPING HAMMER WITH RETAINER.



CROSS SECTION OF THOR AIR DRILL.

Municipal Journal

Volume XLIII NEW YORK, OCTOBER 4, 1917 No. 14

STREET PLANNING AND CONSTRUCTION IN BEXLEY

Care in Selecting and Enforcing Proper Specifications Secures Good Results—Bituminous Pavements of Various Kinds—Concrete Pavement with Integral Curb—Rounded Brick Gutters—Comparative Costs of Different Pavements.

By CHARLES CARROLL BROWN.

Bexley, Ohio, is a village inhabited mainly by business and professional people belonging to Columbus, and adjoins that city. It is rather sharply divided into two sections by the street on which is located the principal car line connecting the two municipalities. The section on one side of this street, comprising the larger part of the village area, contains the population which is in easy circumstances, or is wealthy, and is in general able to pay for what it wants; while those on the other side of this street, although in large part owners of the property in which they live, must exercise great care in their expenditures and must often choose the less attractive pavement because it is all they can afford to pay for.

The village board is progressive and public spirited and has made public improvements for the benefit of the village and its inhabitants and with a view to the whole village as well as to the individual street. The engineers engaged in the development from the start in 1915 have been the Jennings-Lawrence Company, of Columbus, and this has helped to unify the work of the municipality.

In selecting the material for the street surfaces, the decision was made in favor of bituminous surfaces, and they have been used exclusively on the northern side of the dividing street, asphalt being used on all streets but one. The dividing street with the street car line is paved with brick and was built under the state highway laws and not by the village. One street on the southern side is of reinforced concrete, the decision for it being based largely on the lower cost of the construction. The asphalt streets are mainly bitulithic, one or two streets being of sheet asphalt and of asphaltic concrete, Topeka specification. One street is of tar concrete, Topeka under a special Tarvia specification. Most of the streets are of standard construction and require no special description, but some special details have been worked out which will be of interest. A comparison of the cost of the various kinds of construction is also available, as well as a comparison of the cost of the same kind of pavement in each of the past three years. One element in the success of the streets has been the selection of competent contractors for the work, who have done their work well. This, with close inspection by the engineers of both materials and workmanship, as well as the working out of details to fit the conditions of the particular spot, has produced a result which is highly satisfactory.

The character of asphalt construction, sheet asphalt specification, is indicated by the first of the accompanying photographs. The 5-inch stone curb, 6-inch concrete foundation and 3-foot brick gutter will be noted.

FIG. 1—SHEET ASPHALT WITH THREE-FOOT BRICK GUTTERS.

They form one set of standard details. Another set will be described later in detail. Trinidad or Bermudez asphalt was used in all asphalt construction.

The most popular pavement in the village is bitulithic. A newly completed street is shown in the second photograph. The method of constructing curb and gutter is of interest. The straight curb and gutter is of concrete, the gutter being 18 inches wide. The face of the curb is sloped and curved so as to form a rounded profile in cross section, which is an approach to the general form of the special gutter design described more fully below. This gives a very pleasing appearance to

FIG. 2—VERTICAL CURB AT INLET JOINING GUTTER SLOPE AT CORNER.

the gutter and conceals any deflections from a straight line in the face of the gutter, which are so common in concrete curb construction. The apparent irregularity in the curb seen in the photograph is not real, but the appearance is caused by the filling material behind the curb concealing the black line, by dirt in the gutter, and by the shadows crossing the line. The radii of the corners at street intersections are ample for good appearance and for convenience of traffic. The brick gutter with curved cross section is used, somewhat flattened so as to interfere as little as possible with traffic. Where the sidewalk crosses the curb the gutter is brought up as much as possible without interfering with the drainage, and the curb is made of concrete with vertical face. While the inlets for storm water are usually at about the middle point of the curve, they can be placed at the end of the vertical face, so that the water will not flow across the path of the pedestrian if of sufficient quantity to interfere with his progress. This vertical-face curb is finished at the near end (in the photograph) so as to join with the brick gutter around the curve at the corner, which, as shown, requires no curb.

FIG. 3—BRICK GUTTER AT CURB INLET.

Fig. 3 shows the construction of the curb at the inlet for storm water. The brick surface of the gutter and the concrete surface of the inlet structure are clearly distinguishable in the photograph.

On streets of the most recent construction the rounded brick gutter which requires no curb has generally been used. It is seen under construction in Fig. 4, and the cross section is shown in Fig. 5. In the background the forms have been placed on top of the 4-inch concrete base previously placed. This foundation extends 1½ inches below the foundation of the pavement, except for brick and macadam construction, in which it coincides with the pavement foundation. In the middle ground the 1-inch mortar has been placed, and in the foreground the brick pavement has been placed and in part grouted and covered for setting of cement. The standard construction lays five rows of brick lengthwise in the bottom of the gutter and a row each side transversely. With the grout filler, this makes a monolithic construction which thus far shows no signs of separation of the bricks individually, even where the hauling of house building material over it for a number of days had full opportunity to crush the upper edge or knock the bricks loose. Consequently, the construction is not changed where driveways are put in across the sidewalks, except to lower the back of the construction a little to ease off the passage of wheels across the drop in the gutter. The construction is quite as flexible in this way as concrete, and property owners can have their driveways made to suit them, provided they do not break the cement sidewalk surface too much.

FIG. 4—CONSTRUCTING CURVED BRICK GUTTER.

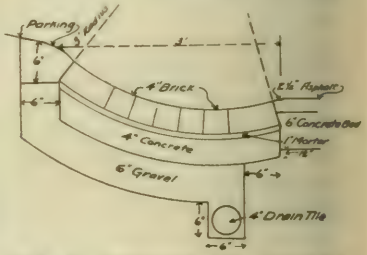


FIG. 5—SECTION OF CURVED BRICK GUTTER.

The construction of the street on which the Topeka specification asphaltic macadam was used was better than usual. No segregation of large stones in some areas, with too fine stone in others, was observed, and the pavement had almost as good appearance as the bitulithic streets. The engineers recognize the exceptional character of the construction they have secured and the greater certainty of good results with the more scientifically designed bitulithic pavement.

The standard specifications, on which all bids are received, provide for standard sheet asphalt, standard bitulithic, sarcolithic mineral rubber, asphaltic concrete, using Topeka mixture, bituminous concrete with Tarvia X, using Topeka mixture, and penetration method macadam. One street has been constructed using Tarvia, but with the specifications somewhat different from the

standard printed. The requirements for this street are clean ¼ to 1¼ inch broken stone heated to a point between 120 and 200 degrees F. and thoroughly mixed with 20 gallons per cubic yard of Tarvia X heated to a point between 200 and 250 degrees F. The mixture is spread while warm 2½ inches thick on the base and rolled to thickness of 2 inches. A surface coat of one-half gallon of Tarvia, heated to 200-250 degrees, is covered with screenings or sharp sand and rolled until compacted, enough screenings or sand being left on the surface to protect the road while it is setting up. A hot mixer was used, and the processes of mixing and spreading are shown in Fig. 6. The principal difficulty with the construction was in the lack of capacity of the mixer, which made the work slow. It was apparently impossible to make the mixtures uniform, and the segregation of sizes is apparent on the surface in some places. Fig. 7 shows the compacted course of material before the surface was covered with the surface coat. This photograph shows none of the segregation of sizes mentioned. The finished pavement is shown in Fig. 8, which shows also the rounded brick gutter.

The concrete pavement on Pleasant Ridge avenue was constructed on the plan shown in the accompanying cross section of the street. It will be noted that the bottom line of the concrete is horizontal and that the crown in the upper surface is made by using a thickness of 6 inches

FIG. 6—MIXING AND LAYING SPECIAL TAR CONCRETE.

at the gutter and 8 inches at the center of the street. The curb is integral with the pavement and the reinforcement used in the pavement is turned up at the ends and extended through the curb, thus locking curb and pavement closely together. The wire mesh reinforcement is located 2 inches from the outer surface of the concrete. The triangular mesh reinforcement used was sufficient, so far as strength was concerned, but the sheets of metal were not stiff enough to keep their shape when put in place, and so there was trouble in keeping them exactly in position during the process of placing the concrete. Expanded metal or the trussed concrete mesh are more satisfactory in handling on the job on this account. Fig. 10 shows the nature of the surface finish, the construction of an expansion joint through pavement and curb, reinforced with steel protection plates, trussed concrete design. The ample radius of curb corners is shown also. The surface of the pavement is excellent throughout, the only defect being that at some of the joints the pavement is slightly above the remainder of the surface, so that in riding over it there is a noticeable waviness in the running. This may have been because the templet used sagged somewhat in the center, since the effect is more noticeable in the middle of the street. Or it may have been because the amount of concrete was slightly too small and the finishing process lowered the surface between joints, at which lines it

FIG. 7 COMPACTED TAR CONCRETE WITHOUT SURFACE COAT.

would naturally be brought up to full height to meet the tops of the reinforcing plates. This effect was much less than in an Iowa pavement which the writer observed, where the high joints were so numerous that it was practically impossible to drive an automobile comfortably or even safely at more than 10 miles an hour.

The street car company was not required by the terms of its franchise to pave between its tracks, and in one case the pavement was laid at the expense of the property owners. On one street the company agreed to pay the cost of a macadam pavement between the rails and one foot outside the single track, the macadam to be treated with glutrin. This work was done last year, and the tracks are everywhere easy to cross by traffic. The traffic is light and the pavement so good that the traffic does not touch the track area except to cross. Brick is laid at all street intersections, where the tracks are crossed regularly. The sinking of tracks in these brick intersections is the one blot on the excellent paving of the village. Every intersection shows some settlement after one or two years of use, and some of them are already in condition to make crossing by automobiles faster than a walk very uncomfortable.

INSPECTIONS AND REPORTS.

The inspectors on the work were required to make detailed reports each day. The regular daily samples required by Warren Brothers Company were taken of all

FIG. 8—FINISHED TAR CONCRETE PAVEMENT.

bitulithic construction and sent to that company's laboratory for analysis. The location from which every such sample is taken is recorded on a plat, with exact measurements of location and full statement of the mixture and amount of each ingredient and size of stone used, weights, etc.

A report was made of each block of concrete pavement laid, between expansion joints, on a form from which the following sample entries are made to show the care with which the work was done and the control of mixtures. The data will serve also to compare results and possibly to locate the reasons for any defect in the pavement which may develop during use. For convenience

Data Kept Concerning Concrete Pavement Construction.

Number of section	2	13	16	17	18	19
Date, August	2	8	10	10	10	11
Length	40	32	32	32	32	36
Area (to be computed).						
Cubic yards (to be computed).						
Sacks of cement required	152	121	122	122	122	137
Sacks of cement actually used	128	129	134	124	120	137
Per cent. of error (to be computed).						
Sacks of hydrated lime used	30	10	12	12	11	12
Average daily temperature	95	80	95	95	95	80
Time required for initial set, hours	4	5	4	3½	4	5

REMARKS.

No. 2. Curb was all poured from 2 to 3 hours after base was in; that is, curb was completed in that time.
No. 13. Rained on section from 8 till 11 a. m. One 10-foot drive in this section.
No. 16. Weather fair.
Nos. 16, 17, 18. "Beat this if you can."
No. 19. Rained hard on this section. Refloated a part of it. Left some go just as it was.

date are made on a regular form 7½ by 14 inches, on which appear columns with the list of items in the standard specifications, blank for Quantity Completed, blank for Unit Price, and blank for Total Due on each item. At the bottom are given blanks for Total to Date; Total of Previous Estimates; Amount of This Estimate (difference); 10 Per Cent. of This Estimate; and Amount Due (difference).

Approved for payment by village council (date).

Correct (signed by resident engineer, village engineers, village clerk).

Bids were received for all the work of the season of 1915 on one day in June, and the prices at which the work was let (not always to the lowest bidder) are excellent for comparing the cost of the various kinds of pavement used, since all the streets were newly laid out, all were of the same general character and had the same kinds and amounts of work to be done, had the same easy grades and treatment of drainage on surface and in storm water drains. A good comparison of costs can therefore be made.

in printing, the data for each slab or section are arranged in the table in vertical lines.

The form for the report on the concrete pavements was devised by Orin C. Stout, general manager for the Jennings-Lawrence Co.

Contractors' estimates of work done at a settlement

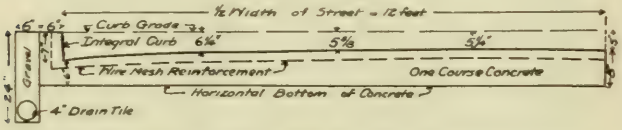


FIG. 9—HALF SECTION OF CONCRETE ROADWAY.

FIG. 10—CONCRETE PAVEMENT, WITH INTEGRAL CURB AND EXPANSION JOINT.

For the pavement proper, complete on a 6-inch concrete foundation, the prices were as follows:

Brick, Barthmon & Knight, contractors	$1.65
Sheet asphalt, W. M. Graham & Kinnear, contractors.	1.80
Bitulithic, Cleveland-Trinidad Paving Co., contractors.	1.85
Asphaltic concrete, Topeka form, Barthmon & Knight, contractors	1.48
Bituminous concrete, Tarvia special, McGary & Sparks, contractors	1.55
Concrete, Barthmon & Knight, contractors	.90

Of the other work involved, the prices were quite uniform, as follows, in the same order as the above:

Grading: Cents per cubic yard, 45, 40, 45, 40, 49, 45.
Curb: Straight, per linear foot, 50, 45, 55, 50, 55, 40 (integral); circle, per linear foot, $1, 90, $1, 90, $1, 40 (integral); redressed, per linear foot, —, 15, 10, —, 20, —; reset, per linear foot, —, 20, 10, —, 15, —; edging, per linear foot, 15, 20, 17, 20, 8, 15.
3-foot brick gutter: 4-inch base, —, 60, 60, 55, 67, —; curved, 6-inch base, —, 70, 70, —, 75, —; curved, 4-inch base, —, 65, 65, —, 70, —.
Catch-basins, each: $35, $35, $35, $30, $30, $35.
Manholes, each: $25, $40, $30, $30, $25, $25.
12-inch pipe sewer, per linear foot, 60, 70, 65, 50, 55, 65.
15-inch pipe sewer, per linear foot, 80, 80, 82, 70, 75, 80.
18-inch pipe sewer, per linear foot, $1.10, $1, $1, 90, 85, $1.
20-inch pipe sewer, per linear foot, $1.15, $1.30, $1.30, $1, $1.15, $1.25.
24-inch pipe sewer, per linear foot, —, $1.80, $1.75, —, $1.45, $1.45.
4-inch drain, cents per linear foot, 7, 6, 6, 7, 7, 7.

The majority of the pavements constructed being bitulithic, it is evident that in 1915 the cost of the pavement had little to do with the choice made of material to be used.

THE USE OF COPPER SULPHATE

Suggestions Concerning Its Application to Reservoirs to Destroy Algae—Prompt Application Desirable—Relation to Destruction of Fish.

In a paper before the New England Water Works Association entitled "Control of Microscopic Organisms in Water Supplies," William Haine, of the Newlands Sanitary Laboratory, after briefly discussing the trouble given by such organisms and the origin of the use of copper sulphate in combating it, gave the following suggestions for the use of this material and opinions concerning its effect on fish.

The treament . . . consists essentially of placing weighed quantities of copper sulphate in loosely woven bags and dragging them from the stern of a motorboat. This is preferable to a rowboat, since the movement of the propeller assists materially in spreading the chemical evenly over the surface of the water.

While the services of a technically trained man are not necessarily required for this phase of the work, it is essential that some judgment be used in determining the rate of solution from the bags and controlling the amounts of chemical dissolved in the various parts of the reservoir in order to get the best distribution. It has been the writer's experience that better results are obtained if slightly larger quantities of the chemical are added to the shallow areas, as the heaviest growths are most frequently found in these localities.

As the amount of chemical required for successful treatment of a supply depends in a large measure upon the types of organisms present, it is necessary to know what types we are dealing with, since some of them are more susceptible to the action of copper sulphate than others. We have found that most uniformly successful results are obtained when the amount of chemical is determined on the basis of the most resistant types of odor-producing organisms in the supply. If the dosage is insufficient to kill the more resistant forms, secondary growths develop which also produce trouble. Scientific studies of the amount of copper sulphate necessary for killing various organisms may be found in the literature on this subject and the results of practical treatment coincide with the figures thus recorded.

In this connection, the most common mistake of the water works man is to defer action until the growths have developed to such an extent that the consumers object. The treatment produces best results when used as a preventive measure rather than as a cure, therefore it is highly advisable to treat promptly at the first sign of a decided increase of odor-producing algae. This information can be obtained only by microscopic examinations made at regular intervals, especially during the time when trouble is to be expected. In this way, the odor-producing organisms are detected at their first appearance and prompt treatment destroys them before the consumers are aware of any possible difficulty. Although the method is undoubtedly efficient under proper control, it cannot be emphasized too strongly that a definite knowledge of the condition of the reservoir is always required if uniformly successful results are to be obtained.

In some intsances, subsequent to the treatment of a supply, large numbers of fish have died, and for this reason numerous researches have been carried out to determine the tolerance of various types of fish to copper sulphate. It has been shown that trout can be killed with .14 parts per million of copper sulphate, while black bass are able to withstand up to 2.10 parts per million, and other species range between these limits A phase of the problem that has not been emphasized, however, is the effect of the reduction of the dissolved oxygen in the water following copper sulphate treatment. Laboratory tests of water after treatment show a material reduction in the numbers and types of algae with rapid increases in the numbers of bacteria, and accompanying these changes the dissolved oxygen in the water is very materially reduced. This change is due to the bacterial activity involving the oxidation of decomposing algae growths. Our records covering a great many copper sulphate treatments show that there has been no destruction of fish life in the cases where the treatment was given before the growths had developed to any great extent. In many cases the amount of copper sulphate used was greater than that given in the literature as sufficient to kill certain types of fish which were present.

There are numerous records to show that great numbers of fish have been killed as a result of the sudden reduction of the dissolved oxygen content of reservoirs and lakes, following the destruction of heavy growths of algae by marked changes in weather conditions. This trouble was experienced by one of our Connecticut cities during May of this year, and twelve barrels of fish were taken from the supply. Another instance was reported in Flushing, New York, where 200 carp and a number of perch were killed in lake Kissena. Sensational reports were circulated to the effect that the fish had been poisoned, but an investigation conducted by a chemist of the New York Water Department brought out the fact that the death of the fish was due, not to any posionous foreign substance in the water, but rather to a lack of oxygen. Similar conditions have been reported in Massachusetts, New Jersey, and in other states, where copper sulphate had not been used. In the writer's opinion, many instances where large numbers of fish have been killed following copper sulphate treatment, the difficulty has been due to the sudden destruction of large volumes of vegetable growths rather than to any direct poisonous effects of the chemical.

It has been asserted that anything which would destroy fish would be harmful to man, and there are some who object to the treatment on these grounds. Authorities are agreed, however, that copper sulphate as it is ordinarily applied in ridding supplies of microscopic organisms does not endanger public health. The fact that many cities throughout the country have been getting relief for a number of years by the use of the treatment without any evident adverse effects is a good indication that the method is not a dangerous one and merits the attention of any municipality where objectionable types of algae exist in the water supply.

EXCAVATING IN SHALLOW CUT.

In the double tracking of a street railway through the village of Milford, Connecticut, in connection with the construction of a concrete road and the improvement of the main traffic route through the village which was described in the August 2nd issue of Municipal Journal, it was necessary to excavate about a mile of street to the depth of 15 to 18 inches. For this work a Keystone Traction Excavator is being used. The average amount of material handled per day is 200 cu. yds., the excavator cutting about 180 ft. of road 24 ft. wide and 15 to 18 inches deep in a 9-hour day. For removing the spoil, motor trucks are used, the excavator discharging material directly into them. The contractor, Robert D. Daley & Co. of New Haven, owns and operates two 4-ton Riker motor trucks, made by the Locomobile Co., and hires, when needed, a 5-ton Kelly-Springfield truck.

The haul varies as the work progresses, but at present

averages about one-half mile. Three minutes are required by the excavator to load a truck and 10 minutes are required for making the trip to the dump, dumping and returning to position for another load. The trucks are backed close to the excavator so that they can be fully loaded without any delay due to moving the trucks or the excavator. Whenever the trucks are not in place to be loaded, the excavator scrapes the earth into a pile on one side, so that it will be out of the way when the truck backs into place and will be handy for rapid loading.

The excavator is also used for digging up trees, lamp-posts, curbing, sidewalks and whatever other encumbrances are encountered. When delays of this sort are encountered, only 1 or 2 of the trucks are used for hauling the excavated material, the others being used on stone, sand or cement hauling, or other work. Some delay is caused by traffic, which has to be maintained on one railway track and on the street up to the point where actual excavation is being made.

Only one man is assigned to each of the trucks and four are employed on the excavator. Two of these are the engineer and fireman, while the others clean up around the excavator and lay the planks preparatory to moving ahead.

THE COST OF LAYING WATER MAINS

Detailed Figures of Costs in Saginaw and Chicago—Pipe, Lead and Other Materials, Labor, Cartage and Other Costs.

The figures given in the tables herewith, showing the cost of constructing water mains in Saginaw, Mich., indicate a considerable increase in cost of pipe line construction for 1916 over 1915. A large part of this is due to the increase in the cost of cast iron pipe, which rose from $23 to $30.36 per ton, but some can be charged to a general increase of expense in all branches. The average total cost of 6-inch main, which constituted more than half of that laid each year, was 90 cents a foot in 1915 and $1.08 in 1916. Of this difference of 18 cents, 11.9 cents was in the cost of the pipe itself.

The cost of laying pipes in the eastern and western districts of the city during 1916 is given in detail in the tables on this and the opposite pages.

For the purposes of comparison, the costs for 1915 are given under the same heads.

COST OF WATER MAINS IN CHICAGO.

During 1916, the city of Chicago laid 125.22 miles of water pipe of various sizes, installed 934 fire hydrants and set 1,547 gate valves. All this work was embraced in regular extensions. Accurate cost records were kept in all cases and below are given the detailed costs of constructing about 15 miles of the larger sizes laid during 1916. For the most part, up-to-date machinery and equipment was used in this work.

Line No. 1, comprising 1,360 feet of 24-inch main, was all laid by hand, except that a large part of the trenching was done by machine. Most of the trenching on line No. 2 also was done by machine and the conditions on these two lines were much the same. For constructing lines 3, 4, 5, 6 and 7, very complete equipment was used. This included a trenching machine, a locomotive crane, and air compressor for operating pneumatic calking hammers. On line No. 8, the work was done entirely by hand under considerable difficulty.

(The table giving the Chicago figures will be found on page 330.)

Detailed Costs of Water Mains in Saginaw, Michigan.

EASTERN DISTRICT, 1916.

Street	Feet of hydrant pipe	Pipe: Total feet	Pipe: size	Pipe: Price per ton	Pipe: Amount	Lead, oakum, coke and oil	Cartage	Engineering	Labor	Labor per linear foot of pipe	Foundry inspection $0.40 per ton	Miscellaneous	Feet of main	*Total cost	Total cost per linear foot of main
Eighth	36	2,590	12"	$30.36	$ 3,286.77	$ 353.52	$ 68.67	$ 24.75	$1,354.08	$0.530	$ 45.30	Old H'se	2,590	$ 5,626.47	$2.17
		114	6"		76.57	11.50	1.45	1.25	29.67	0.206	0.90	Conn.	108	135.14	1.25
												$58.50			
Fenton		680	6"	30.36	361.29	15.50	5.25	3.15	211.38	0.311	4.87	.....	680	668.66	0.98
Fourteenth	12	734	6"	30.36	389.97	50.11	9.00	5.25	279.44	0.381	.....	.....	722	819.72	1.14
Gilmore	..	97	6"	30.36	51.52	9.72	1.15	1.00	48.25	0.497	0.76	.....	97	127.59	1.31
Glasby	..	464.5	6"	30.36	246.79	10.11	5.22	3.12	170.82	0.368	3.54	.....	464.5	512.90	1.10
												Pav'm't 30.00			
Kirk	36	36	6"	30.36	19.13	1.11	1.00	0.75	25.33	0.704	0.60	Old H'se 22.50	1,211.5	1,707.81	1.41
	36	1,211.5	8"	30.36	871.67	109.29	18.54	11.35	369.70	0.305	11.36	.....			
Linton	..	135	6"	30.36	231.12	22.07	4.56	2.97	177.00	0.407	3.04	Pav'm't 90.00	435	484.26	1.11
												H's Con. (old) 166.50			
Tenth	24	24	6"	30.36	12.76	2.95	0.70	0.75	10.00	0.417	0.40		3,318.5	7,184.82	2.16
	24	3,318.5	12"	30.36	4,211.18	380.00	82.02	32.15	1,658.75	0.496	55.14				
Thirteenth	12	1,310	6"	30.36	696.00	98.36	15.72	9.10	446.88	0.341	.....	.....	1,298	1,378.66	1.07
Twelfth	36	1,329	6"	30.36	706.10	106.37	16.08	9.00	401.81	0.302	.....	.....	1,293	1,438.71	1.11
												Old H'se Conn. 9.00			
Tuscola	12	360	12"	30.36	456.84	55.01	9.37	6.42	184.00	0.511	0.20	Pav'm't 260.00	360	857.72	2.38
		12	6"	30.36	6.38	1.30	0.70	0.75	5.00	0.417	6.15				
Wadsworth	24	485.5	12"	30.36	616.10	73.45	13.76	4.25	340.25	0.706	8.30	Removal old 4" 10.00	485.5	1,571.27	3.23
		24	6"	30.36	12.76	2.95	0.70	0.75	10.00	0.417	0.40				
												Pav'm't			
Webber	96	2,544	8"	30.36	1,830.41	232.98	37.20	22.50	825.19	0.324	24.00		2,544	3,687.62	1.45
Wilkins	96	96	6"	30.36	51.04	11.00	2.80	3.00	40.00	0.417	1.60	25.00			
Wisner	12	313	6"	30.36	166.30	29.35	3.50	2.25	113.25	0.362	2.25	.....	301	388.84	1.29
		494.5	6"	30.36	262.73	35.01	5.60	3.50	162.88	0.328	3.53	.....	494.5	526.06	1.07

WESTERN DISTRICT, 1916.

Street															
Bates	36	1,539	6"	30.36	$17.67	135.11	18.69	8.47	420.75	0.274	19.96	.....	1,503	1,646.50	1.09
Bates	..	290	2"	25.6c per ft.	74.24	.....	.....	1.00	41.70	0.144	.....	.....	290	129.91	0.41
Charles	24	6445	6"	30.36	242.42	56.04	8.18	1.34	165.56	0.257	4.62	.....	6295	704.41	1.14
Clinton	36	1,261.5	6"	30.36	670.23	90.05	15.87	9.00	325.00	0.258	9.28	.....	1,225.5	1,311.28	1.07
Fayette	..	120	6"	30.36	63.76	11.30	1.15	1.25	29.67	0.247	0.86	.....	120	108.82	0.91
Grout	36	856.8	6"	30.36	155.22	93.22	12.40	6.68	248.31	0.289	6.97	.....	829.8	1,012.65	1.23
Hamilton	..	752.5	6"	30.36	399.80	68.32	8.63	5.30	229.50	0.305	5.20	.....	752.5	768.70	1.02
Cronk	..	72	6"	30.36	38.25	7.44	1.00	0.75	50.66	0.703	0.66	.....	72	98.70	1.37
Maple	..	102	6"	30.36	54.19	10.49	1.10	1.50	41.56	0.407	0.75	.....	102	114.99	1.13
Pleasant	12	1,076	6"	30.36	571.68	84.28	12.27	7.44	239.21	0.222	7.62	.....	1,054	1,006.35	0.95
Wood	36	1,667	6"	30.36	885.68	168.52	19.81	11.53	380.88	0.228	11.90	.....	1,631	1,663.02	1.02
Davenport	..	72	6"	30.36	38.25	7.44	1.00	0.75	53.39	0.741	0.60	.....	72	101.43	1.41
Maple	..	91	6"	30.36	48.35	9.72	1.40	1.25	27.00	0.297	0.75	.....	91	92.37	1.01
Madison	..	251	2"	25.6c per ft.	64.26	.....	1.00	1.00	41.89	0.167	.....	.....	251	108.15	0.43
Totals	..	25,497.8	..	.....	$19,087.37	$2,427.26	$105.79	$208.22	$9,158.76	.....	$232.39	$671.50	25,017.8	$35,978.64	....

*Including specials, valves, valve boxes and hydrants.

EASTERN DISTRICT. 1915.

Street	Total feet	Pipe Size	Pipe Price per ton	Pipe Amount	Lead, oakum, coke and oil	Cartage	Engineering	Labor	Labor per linear foot of pipe	Foundry inspection $0.40 per ton	Miscellaneous	Feet of main	*Total cost	Total cost per linear foot of main
Alger	410.5	6"	$23.00	$ 169.20	$ 26.38	$ 4.96	$ 2.80	$ 80.12	$0.195	$ 2.97		388.5	$ 334.97	$0.862
Annesly	370	16"	23.00	529.00	54.70	14.58	3.70	251.10	.68	3.62	$46.56	370	905.68	2.44
	226	12"	23.00	218.50	25.82	6.00	2.25	213.18	.945	3.90	22.00	226	578.17	2.28
Cambrey	231	6"	23.00	95.20	15.67	2.63	1.60	84.31	.365	1.69	..	231	215.64	.93
Campbell	36	6"	23.00	14.84	6.84	.94	.50	25.60	.71	.29	9.50	24	114.06	.957
Cedar	661	6"	23.00	272.55	43.37	8.51	4.45	149.68	.226	4.84	.	657	618.86	1.04
Cornelia	667	6"	23.00	274.94	45.02	8.52	4.50	166.88	.25	4.84	41.75	644	690.85	.242
Douglas	650	2"	.....	27.92	.....	.....	1.00	87.00	.134	.....	34.80	650	177.37	.96
Dwight	635	6"	23.00	262.09	41.19	8.22	4.35	163.00	.257	4.84	.	621	787.45	1.27
Fourth	1,483.5	12"	23.00	1,426.00	146.28	75.13	14.85	603.10	.407	19.89		1,483.5	2,456.24	2.31
Gage	1,738	16"	23.00	2,501.25	263.75	66.00	17.35	1,179.06	.68	43.68	124.80	1,738	4,088.15	2.31
Germania	285	6"	23.00	118.68	18.24	3.28	2.00	90.36	.317	2.08	6.50	285	327.82	.805
Holden	.....	6"	23.00	4.95	3.81	.75	.50	15.19	.....	.10			24.80	
	2,018.5	16"	23.00	2,898.00	292.26	85.11	20.20	1,369.35	.68	55.84	222.60	2,018.5	5,281.24	2.62
McCoskry	.....	6"	.....	4.95	3.81	.75	.50	15.19	.....	.10			24.80	
Morse	24	6"	23.00	9.89	4.03	.75	.50	18.00	.75	.20	9.50	24	61.87	
Rellis	520	6"	23.00	217.58	36.91	6.25	3.65	156.00	.30	4.11	..	520	427.54	.818
Simoneau	93.5	4"	23.00	25.76	5.00	.75	.75	38.50	.412	.50		93.5	70.45	.81
Spruce	668.5	6"	23.00	276.92	18.91	8.63	4.50	200.86	.30	4.92	37.96	644.5	711.86	1.10
Thayer	1,151	6"	23.00	474.72	82.56	15.03	7.75	211.80	.193	8.45	1,145	1,026.80	.89
Tenth	2,565.5	12"	23.00	2,161.00	220.50	131.31	25.65	1,096.01	.427	86.24	83.60	2,565.5	3,450.00	1.705
Ward	459	6"	23.00	187.91	27.73	5.20	3.21	129.75	.283	3.27		459	382.07	.84
Warren	647	6"	23.00	267.03	41.33	7.56	4.45	159.71	.247	4.68	35.25	647	597.13	.938
Washington	142	24"	23.00	388.42	56.18	11.31	8.00	383.26	2.70	7.54	129.50	142	1,166.67	
Weadock	97	16"	23.00	138.92	20.74	4.14	1.00	65.80	.68	2.76		97	280.11	2.90

WESTERN DISTRICT, 1915.

Ames	2,292	6"	$23.00	$944.50	$123.04	$27.02	$ 15.70	$ 450.11	$0.197	$ 16.62		2,244	$ 1,577.67	$0.703
Ames	2,123	16"	23.00	3,053.25	338.73	82.47	21.25	1,241.24	.586	53.88	$318.10	2,123	5,108.78	2.40
Benjamin	855	6"	23.00	351.10	39.92	10.62	5.85	185.54	.217	6.25	.	855	599.28	.701
Benjamin	752	6"	23.00	311.54	38.85	9.38	5.10	164.20	.218	5.55		728	534.62	.734
Cooper	22	6"	23.00	9.89	2.28	.40	.25	4.89	.222	.17		22	17.88	.813
Cooper	166	6"	23.00	69.23	11.00	1.87	1.15	31.52	.208	1.24		166	126.64	.76
Charles	1,287	6"	23.00	529.12	80.67	16.04	8.75	262.04	.204	9.37		1,287	1,086.75	.87
Charles	300	6"	23.00	123.63	13.46	3.88	2.00	76.53	.255	2.22		288	277.09	.96
Durand	189.5	6"	23.00	207.69	27.14	6.18	3.40	95.35	.191	3.66		486.5	411.60	.846
Greenwich	1,953	6"	23.00	801.09	137.91	24.61	13.25	410.09	.210	14.28	1,871	1,719.24	.92
Hanchett	154	6"	23.00	187.91	27.03	5.49	3.20	94.10	.208	3.56		454	348.87	.765
Harrison	271.5	6"	23.00	113.74	15.87	3.76	1.60	72.36	.267	2.04		271.5	278.04	1.02
Houghton	613.5	6"	23.00	252.20	32.48	6.90	4.30	153.00	.250	4.50	6.50	613.5	488.97	.797
Madison	1,669.5	6"	23.00	687.36	91.77	20.61	11.35	370.75	.226	12.08	2.25	1,621.5	1,419.07	.873
Niagara	294.5	16"	23.00	414.00	65.63	12.02	3.00	172.90	.586	7.22	34.80	294.5	877.22	2.96
Niagara	133.5	6"	23.00	54.40	6.86	1.42	1.00	32.25	.242	.95		133.5	97.48	.73
Oakley	822.5	6"	23.00	341.21	47.91	10.31	5.60	169.40	.206	6.04		798.5	696.88	.874
Oakley	108	6"	23.00	44.51	8.31	1.37	.75	27.00	.25	.81		108	101.84	.943
Porter	1,132.5	16"	23.00	2,056.20	202.05	55.50	14.35	839.80	.586	36.10	60.00	1,132.5	3,264.05	2.42
Ruby	617	6"	23.00	267.03	37.22	7.72	4.50	188.55	.222	4.68	20.00	617	511.04	.945
State	38.5	6"	23.00	14.84	3.08	.55	.50	7.70	.197	.57		28.5	40.52	1.06
	23			9.89	2.17	.25	.50	5.11	.222	.17		23	18.06	.787
State	477.5	6"	23.00	196.81	23.44	5.44	3.35	157.35	.33	3.50		477.5	427.88	.896
Stone	48	6"	23.00	19.78	2.78	.52	.35	15.84	.33	.34		48	39.16	.838
Webster	324.5	6"	23.00	133.52	17.03	1.23	2.19	110.80	.341	2.35		324.5	345.12	1.063
Barnard	2,242.5	6"	23.00	924.72	108.51	24.67	15.35	488.28	.217	16.44		2,184.5	1,843.75	.84
Totals	35,628.0	..	.....	$25,385.38	$3,036.48	$819.91	$288.60	$12,796.01	..	$522.12	$1,239.71	35,100.00	$49,505.28	..

*Including valves, valve boxes, specials and hydrants.

Cost of Laying Water Mains in Chicago in 1916.

	1,360 ft. 24-inch Pipe	7,990 ft. 24-inch Pipe	11,120 ft. 36-inch Pipe	2,670 ft. 30-inch Main	10,688 ft. 24-inch Pipe	9,350 ft. 12-inch Pipe	15,583 ft. 24-inch	5,013 ft. 24-inch	10,284 ft. 36-inch & 9st ft 48-inch	4,149 ft. 48-inch Pipe
	1	2	3	4	5	6	7	8	9	10
Pipe	2.668	3.175	5.709	4.607	3.201	1.030	3.161	2.846	6.431	2.425
Castings	.315	.224	.227	.131	.146	.039	.136	.243	.264	.130
Valves	.183	.106	.113	.042	.106	.048	.174	.226	.180	.053
Hydrants	.139	.035	.028	.024	.059	.114	.066	.046	.040	.068
Head	.205	.242	.460	.385	.336	.089	.233	.239	.373	.184
Mason Material	.097	.064	.088	.049	.090	.028	.092	.125	.104	.037
Miscellaneous Material	.086	.085	.098	.058	.087	.010	.048	.056	.100	.044
Supervision	.139	.108	.062	.062	.073	.024	.084	.099	.124	.069
Calking	.218	.274	.215	.188	.303	.074	.243	.149	.318	.319
Laborers	1.534	.974	.888	.736	.891	.212	1.089	.851	2.564	.951
Mason Laborers	.162	.065	.121	.026	.103	.024	.096	.084	.112	.047
Masons and Foremen	.092	.030	.072	.015	.058	.013	.043	.043	.056	.021
Plumber	.010	.041	.023	.....	.....	.....	.007	.006	.044	.021
Hoisting Engineer	.....	.090	.170	.109	.215	.018	.072	.042	.070	.....
Pipe yard charges teams	.154	.245	.223	.336	.341	.083	.190	.303	.478	.111
Other	.....	.005	.....	.....	.....	.....	.....	.009	.....	.006
Total cost per foot..	$6.113	$5.956	$8.615	$6.765	$6.014	$1.823	$5.830	$5.692	$12.229	$5.421

ULTRA VIOLET STERILIZATION AT HENDERSON.

As has previously been stated in Municipal Journal, Henderson, Ky., has for some months been using the ultra violet ray method of treating its water supply. This is the first municipal installation in the world of the pressure type. The city obtains its supply from the Ohio River, and until 1916 used it with no treatment except such sedimentation as occurred in the distributing reservoir, which holds about 1½ days' consumption. Then it contracted with the Pittsburgh Filter Manufacturing Co. and the R. U. V. Co. for a sedimentation, filtration and sterilizing plant with a capacity of three million gallons a day with provision for doubling that capacity later. J. W. Ellms served as consulting engineer.

The plant consists of two coagulating basins each 95.5 by 30 ft. and 16 ft. deep; two baffled mixing chambers 25 by 17.5 ft. and 17.5 ft. deep; six filter units, each 17 ft. by 13 ft. 4 in., with a normal capacity of 625,000 gallons; and a sterilizer consisting of three legs, each comprising 5 units. The detention period in the coagulating basins is four hours with a consumption of 3,750,000 gallons a day, and the capacity of the settling basins is 620,000 gallons. The basins and filters of standard reinforced concrete construction and are covered by a brick building. A clear water well underlies the filters and pipe gallery, and adjacent to this is an underground room 28 by 17 ft. which contains the sterilizing apparatus.

The three legs of the sterilizer are connected in parallel and receive water from the clear water basin and deliver it to the suction well of the pumping plant. Each of the five units in each leg has a lamp box inserted in its side equipped with a clear quartz V-shaped tube that projects into the body of the unit and around which the water is forced to flow in a thin film by means of a baffle placed at right angles to the long axis of the sterilizer. The quartz tube contains a 220-volt, D. C., ultra violet ray lamp consiting of a mercury vapor arc. A stirring device of the screw or propeller type operates in each unit to insure that each particle of water passes within the range of influence of the lamp. On the main switchboard is a tell-tale incandescent so connected with each ultra violet lamp as to indicate if any lamp fails or diminishes in power, a warning bell ringing to attract attention.

The plant was put into operation near the end of 1916. the amount of water treated daily varying from 2,200,000 gals. to 3,200,000 gals. The R. U. V. company guaranteed to produce water free from B-Coli, with a current consumption not to exceed 0.77 kw. per lamp. These guarantees were reported to have been met during the test run. The consumption was 92.5 kw.-h. per million gallons.

The following figures are taken from daily tests run continuously for over two months. The bacteriological work was done in accordance with the "Standard Methods" of the American Public Health Association.

Result of Bacterial Analyses During Test Run.

Sample.	Total No. of Samples.	Total Bacteria per 1 cc., 24 hrs. incubation. Maximum Count.	Total Bacteria per 1 cc., 24 hrs. incubation. Average Count.	Total B. Coli per 1 cc., 48 hrs. incubation. Maximum Count.	Total B. Coli per 1 cc., 48 hrs. incubation. Average Count.
Raw	25	190,000	85,000	1000.0	276.0
Coagulated	25	1,200	720	100.0	45.0
Filter	70	320	80	1.0	.35
Influent leg No. 1	52	95	32	1.0	.260
Burner No. 1	48	30	16	.8	.215
" No. 2	48	20	8	.8	.200
" No. 3	48	16	6	.2	.136
" No. 4	48	6	2.1	.1	.09
" No. 5	54	3	.31	0.0	0.0
Influent leg No. 2	53	75	36	1.0	.310
Burner No. 1	47	50	12	.6	.273
" No. 2	47	20	6	.8	.18
" No. 3	47	7	5.2	.4	.117
" No. 4	47	6	1.8	.1	.07
" No. 5	54	3	.38	0.0	0.0
Influent leg No. 3	54	95	25	1.0	.326
" No. 1	47	55	14	.8	.240
" No. 2	47	19	9	.8	.21
" No. 3	47	12	4	.4	.110
" No. 4	47	6	1.6	.1	.06
" No. 5	54	3	.42	0.0	0.0
Tap at pumps	34	11	.39	0.0	0.0

Rate of pumping 2,200,000 gallons per day to 3,200,000 gallons per day with little or no variation in results.
Turbidity of raw water varied from 130 to 880 ppm.
Filtered water usually clear with maximum turbidity of 5 ppm.

STATE EXPENDITURES ON GOOD ROADS.

According to the recently published report by the Bureau of the Census on the "Financial Statistics of States," the total outlays for permanent improvements aggregated $85,099,088. Of this amount, $33,087,410, or nearly two-fifths, was spent for the construction of new roads and the permanent improvement—such as macadamizing or paving—of existing ones. The greatest outlays for roads in individual states were reported for New York, $10,742,913; California, $7,706,376; and Maryland, $3,563,697.

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Contributed Articles and Reports.

Contributions suitable for this paper, either in the form of special articles or as letters discussing municipal matters, are invited and paid for.

City officials and civic organizations are particularly requested to send Municipal Journal regularly their annual and special reports.

Information Bureau.

Municipal Journal's Information Bureau, developed by twenty-one years' research and practical experience in its special field, is at the command of our subscribers at all times and without charge.

WATER PURITY DETERMINATION BY CORRESPONDENCE.

The indignation to which a certain southern city was aroused recently because the Federal public health service had forbidden the railroads to use water from its supply on their trains may have appeared to outsiders like a tempest in a teapot. But it increased in intensity when it was found that the report of the Federal surgeons did not claim that the water showed by analysis any positive evidence of pollution, but expressed the opinion that the supply was extremely liable to be polluted at any time. Local newspapers and citizens freely used the words "autocracy" and "bureaucracy" in referring to the condemnation of their supply. The mayor pointed out that regular examinations by a distinguished chemist and bacteriologist at "stated intervals" had established the purity of the supply, and pronounced it safe for his fellow citizens, whose lives were as precious as those of railroad travelers.

It seems, however, that conditions on the catchment area from which the city's supply is drawn were such, because of poor sanitation of negroes' cabins thereon, as to threaten pollution; and this was admitted by the city officials, and steps have been taken to remedy the condition.

The moral is one which has been presented several times by Municipal Journal and explained by water supply experts—no number of water analyses unaccompanied by a sanitary survey of the catchment area can guarantee the safety of a water supply. City officials must be taught that analyses of water only provide a basis for judgment of the purity of the sample itself, and by inference of the water supply at that particular time, but give no warning of the pollution that may enter it the next day, washed in perhaps by a rain storm from a source of pollution on the catchment area.

Even more important than analyses at stated intervals is a sanitary survey of the watershed at such intervals—a personal inspection, and not a report from a distant laboratory upon a sample sent to it by express, even though such laboratory be that of the state board of health or any other of the highest standing.

COPPER SULPHATE AND FISH.

In a paper before the New England Water Works Association, a large part of which is abstracted in this issue, the effect of copper sulphate upon fish in reservoirs and ponds is discussed. The statements made therein seem to indicate that the preponderance of the evidence is that the use of copper sulphate as ordinarily practiced in destroying algae does not poison fish directly, although the indirect results of such use may be fatal to them. The indirect result referred to is the destruction of such large quantities of the vegetable organisms in the water that the decomposition of these uses up a very large percentage of the available oxygen in the water, and apparently it is this reduction of oxygen that is fatal to certain fish, especially those like trout, which demand water high in oxygen. That it is the deoxidation caused by the decomposition rather than the direct poisoning by the copper appears to be indicated by the fact that comparatively large quantities of copper have been used when the numbers of algae have been small, without killing fish, while in other cases decomposition of algae when no copper has been used has resulted in a wholesale death of fish life in the reservoir.

One conclusion to be drawn from this would appear to be that care should be taken to use the copper sulphate before the algae growth has progressed far in a reservoir, in order that the resulting putrescible matter may be small in amount, and thus deoxidation of the water be kept at a minimum.

MUNICIPAL WASTE PAPER.

A few days ago a report from a certain western city reached this office. It was bound in imitation leather (paper) and printed on a heavy filled paper, the very sight of which sends shivers all the way to a publisher's pocketbook in these days of high cost of paper—and other things. It was neatly printed and bound, and must have cost the city a considerable sum. It contained 215 pages and weighed just one pound.

We believes cities should be encouraged to get out neat and well-printed reports and we have no quarrel with any city over the amount they wish to spend on their annual report—when they have anything to report. But all the valuable information in that 215-page report could have been printed on a 4-page or, at the most, on an 8-page folder. The report for the waterworks department took up 166 pages. Several pages were blank (the others might as well have been); 89 pages were devoted to a list giving the location, size and length of mains, locations of hydrants, etc., all of which information is valuable as a matter of record, and undoubtedly is on file in the offices of the department, but it has no place in the annual report. Sixteen pages were occupied by a list of the water bonds issued; four pages by tapping permits; eight pages by a tabulated list of mains laid during the period covered by the report; the remainder of information in the 166 pages, excluding possibly 2 or 3 pages, can be classified with that listed above as absolutely worthless to any one outside the department.

The report of the sewer department has 2 blank pages,

7 pages of report, mostly a tabular statement of work done, and 40 pages devoted to a list of locations of sewers constructed in the past. The only valuable thing in the whole report is found in some pages inserted in the rear, giving tabular, and really excellent, costs of water main and sewer construction.

Reports like this are, fortunately, in the minority, but the number of cities sending out really valuable information through their annual reports is small and the sums paid for printing annual municipal reports that serve no purpose except to fill shelves in the local city hall, and waste baskets elsewhere, must run to a goodly sum each year. There would seem to be a field here for a consulting technical editor, who can see that the worthless information is left out, that which should be included is furnished by the several officials, the report is properly printed and distributed, and the cost kept down by these same means.

WINDSOR UNDERPASS NEARLY COMPLETED.

NO CONVENTION OF STREET CLEANING SOCIETY.

The executive committee of the Society for Street Cleaning and Refuse Disposal of the United States and Canada has decided to omit its annual convention this year. The reason assigned is that "the labor situation all over the country is so acute that officials in charge of street cleaning and refuse disposal are averse to leaving the field of their respective activities for even the short time required for attending a convention. Manufacturers and dealers, who compose the associate membership of the society, are, in a majority of cases, so occupied with war contracts and with business growing out of the extreme activity in the metal industries that they would be unable to give time to the convention."

In place of the convention, the committee has provided for the issuing of a special report or journal, to be published in pamphlet form by the secretary-treasurer and a copy sent to each member, and to any interested person who may so request. The members are asked to send, as matter for this pamphlet, such papers, queries, suggestions or motions as they would have presented at the convention, in addition to which the secretary will publish in the pamphlet the important items that would have been included in his annual report. It is urged that all matter be in the secretary's hands not later than November 1.

DANGEROUS UNDERPASS ABOLISHED

Replacing Narrow and Crooked Underpass and Straightening Road—Excavating Under Railroad Track and Laying Pavement.

Near Windsor, Conn., there has just been completed an underpass and grade crossing elimination on which the Connecticut Highway Department spent nearly $125,000 in order to eliminate a danger spot and provide a safe and convenient crossing. The old underpass under the tracks of the New Haven Railroad was narrow—too narrow for two automobiles to pass—and there was a very sharp curve at one end. It was so dangerous that everyone was on the lookout, so that few accidents did occur. The sketch shows how the old road curved and how the new construction eliminates all danger and inconvenience.

The plans for the new improvement called for the excavation of an underpass under the railroad tracks, raising the track 4 feet, so as to give sufficient elevation for traffic, and constructing a concrete pavement and sidewalks for the length of the improvement. The contract included the replacement of an old bridge by a modern two-span Warren truss over the Housatonic river; the spans, which measure 109 and 132 feet, respectively, being placed on the old piers, which were reconstructed and reinforced with concrete.

For one reason or another two contractors had thrown up the work, so that it was finally carried to completion by force account by the State Highway Department, under the direction of Robert W. Stevens, division engineer. Men were very hard to get, and most of the time those available did not number more than 15 or 20. During the latter part of the work 16 men were employed.

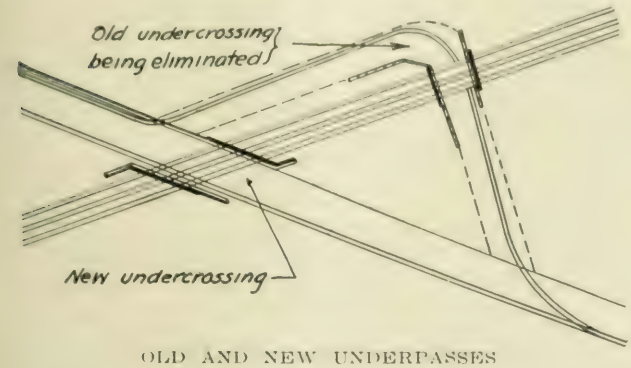
In the excavation of the underpass a Thew steam shovel was employed, and teams were used to haul out the excavated material. As soon as a hole had been cut through and grade reached, tracks for an electric road

JOB LAYOUT AT BRIDGE, WINDSOR UNDERPASS.

were laid, and materials were hauled by this. Much of the work was done in winter, most of the concrete retaining wall and the abutment piers for the railroad crossing being laid in freezing weather. The sand and stone were heated, hot water being used. Concrete was placed only between the hours of 10 in the morning and 3 in the afternoon, and when laid was protected with tar paper, straw and manure, so that no damage resulted. A tower was constructed alongside the railroad track, and this delivered concrete for the abutments and for a section of the retaining wall.

All the stone for the work was hauled by the electric railway which parallels the road. Sand and cement were hauled by motor truck. As stated before, the electric railway was used for hauling out excavated material also.

About 4,500 square yards of concrete pavement with integral curb, 1,160 feet of curbing and 5,000 square feet



OLD AND NEW UNDERPASSES

of cement sidewalks were included in the improvement. The pavement was reinforced with Kahn wire reinforcing. Expansion joints were placed every 35 feet. These were of two-ply tar roofing paper. The mix was 1:2:4, the pavement 8 inches thick in the center and 6 inches on the edges, and 18 feet wide. Underdrains were installed where needed, and in one place where it was feared that good drainage could not be secured on account of the heavy clay base, the excavation was carried 18 inches below the grade line, and a fill of sand was made.

When pavement was being laid, all 16 of the men were required, and other work was temporarily suspended. The make-up of the gang was as follows: One engineer, who also fired; a foreman; two finishers, one of whom floated, while both spaded concrete and worked the template; four men wheeling stone; one man handling cement; two men wheeling sand; three men shoveling stone; and two men shoveling sand. A Koehring No. 14 mixer was used. The barrows were steel measuring barrows furnished by the H. L. Bond Co., Boston. Wooden forms were used.

STEAM SHOVEL AND TEAMS EXCAVATING UNDERPASS.

LENGTHENING RADIUS OF CURB CORNER.

The desirability of using long-radius curves for curb lines at street intersections has often been referred to by Municipal Journal, and most cities now employ for all new construction on heavy-traffic streets a radius of not less than 10 feet and generally not more than 20 feet. But corners already constructed with short radii in such

RECONSTRUCTION OF CURB CORNER TO INCREASE RADIUS.

streets should be changed to long radius. How this was done in one instance is shown in the accompanying illustration. At the intersection of Lake Shore Drive and Division street, Chicago, a 14-foot radius was substituted for an old one of 18 inches. This added 7 feet to the width of the roadway at the corner. Such change is especially easy to make if concrete curb is used.

THE COST OF SURVEYING ROADS.

Since 1913 the State Highway Department of Illinois has made over 400 preliminary surveys of roads under conditions which made the cost rather high. The roads were generally short sections and entirely disconnected, so that the cost of taking men to and from these sections was large in proportion to the amount of work done. The purpose of the survey in each case was to locate a center line for the proposed road, record the features of the country affecting the location, take cross-sections and obtain information concerning drainage and grade conditions. Nearly 1,000 miles of average road were surveyed, at an average cost of $26.40 per mile. The average rate of survey was 0.84 mile per day and the average length of each survey was 2.66 miles. As a rule the work was done by two engineers paid $4.00 a day, three helpers at $2.50, a team at $3.00 and incidentals for transportation, board, lodging and supplies, bringing the total cost per day to nearly $25. The figures are a good indication of the small cost of preliminary engineering work.

The WEEK'S NEWS

State Highway Problems in New Jersey, Nevada, Minnesota and Pennsylvania—Connecticut Controls Industrial Wastes —Economy in Washington's Waterworks System—Fire-Fighting Organization in Portland, Ore., and Los Angeles —Philadelphia's Over Counter Bond Sale—Federal Government Utilizes Cantonment Garbage—Connecticut Cities Oppose Six-Cent Fares—San Francisco Considers Buying Out Railway Company—The Quebec Bridge—Federal Government, Evansville and Denver Try to Reduce Coal Prices—Baltimore's Civic Center—Housing Legislation in Michigan.

ROADS AND PAVEMENTS

Test Constitutionality of New Jersey Road Plans.

Trenton, N. J.—Constitutionality of the Edge road tax law has been attacked by board of works commissioner Charles P. Gillen of Newark, acting in his capacity as a private citizen, in certiorari proceedings before chief justice Gummere of the supreme court. The major part of Mr. Gillen's attack, as presented by his attorney, is the allegation that the Edge act provides insufficient machinery for the levying, apportioning and collecting of the tax. Thus it came that the papers in the case, the application for a writ of certiorari, were not aimed specifically at the Edge road act, but at the Essex County Board of Taxation. It was an application technically to review the action of the county tax board September 19, adopting resolutions setting the figure on which the tax is to be levied. Mr. Gillen said that action similar to his was to be taken in Hudson and Passaic counties, thus constituting a concerted move on the Edge law. In the formal petition for certiorari, it is declared that the County Board of Taxation had no right, under the Edge law, to take the action it did. Mr. Gillen's taxes, it was set forth, were unlawfully increased by one mill on a dollar by the act of the Tax Board in pursuance of the law. One main point in the attack on the act is that the law apparently provides insufficient machinery for collecting the tax. In making his disposition of the petition, chief justice Gummere said: "Of your objections there is one that seems to be worthy of serious consideration. That is the method of procedure under the law. I am not prepared today to dispose of this question, but will ask that you give notice to the attorney general of your application and appear here with him. I do this for the reason that the interest your client (Gillen) has in the case is almost infinitesimal taken by itself; that is, his interest is no more than that of any one of the state's 2,000,000 inhabitants. The matter is a state matter, not a matter of a ward or a district, and the state is entitled to be heard, I think, before anything at all is done by any judge which might jeopardize the interests of the state." The administration's road plans were one of the chief issues in the recent primary campaign and the controversy has swept the state.

Nevada Highway Expenditures.

Carson City, Nev.—The Nevada state tax commission has completed figures regarding estimated expenditures for highways throughout the state during 1917. As the proposed routes of the state highway do not cross any portion of Storey, Clark or Lincoln counties no tax is levied in those counties for this road; but, as the state tax contains a like levy of seven cents on the $100 on all property in the state, for the state highway, these three counties will be reimbursed in such amounts as they shall have paid into the state on this account, less certain overhead expenses; such reimbursement, however, to be expended exclusively for roads within these counties, but under the direction of the state department of highways. In addition to the state levy of seven cents, the legislature appropriated the sum of $40,000 for the state highway fund, and the state automobile license tax also goes to the state highway fund. The license tax for 1917 is estimated at $25,000. The national government will assist the several states in the same amount as the states and counties raise by taxation up to a certain limit, after approval by the department of agriculture of the plans and routes adopted by the various states. The amounts raised by the several counties for the state highway fund will be expended solely for the purpose of the state highway department. The sum of $271,737.19 raised by the several counties for the general road fund has no connection with the state highway, and will be administered solely by the county authorities; but, under the terms of the highway act, the services of the state highway engineer are at the disposal of the counties in the administration of their highway funds if they so elect. The state highway fund from the seven-cent levy, will bring in $110,603.14. The county road and bridge fund of $271,731.19 will make the total $382,340.33. The total state highway fund will be $594,630.56, half of which will be the federal aid and the state highway expenditures are estimated to be $866,376.75. A statement by state highway engineer R. K. West reduces the federal aid estimate to $128,776.60. Surveys, plans and estimates are already well under way for work to begin promptly next spring.

High Prices May Mean Wooden Bridges.

Minneapolis, Minn.—The construction and maintenance of wooden bridges in Minnesota will be radically improved and in many places they will be erected where concrete and steel bridges have been planned. The Minnesota Highway Commission has been investigating every form of bridge construction in order to overcome the prohibitive prices of steel and concrete. The chief objection to wooden bridges has been the annual cost of replanking. In Minnesota alone replanking has cost $375,000 on wooden bridges. After an exhaustive investigation the commission has found a bituminous surfacing that will last as long as the average plank floor and will cost only one-third as much. The bituminous surfacing is spread easily over the plank floor and becomes smooth within a short time. C. M. Babcock, state highway commissioner, has started a campaign which will inform every county commissioner in Minnesota about the new surfacing and the chance to avoid high prices. "The new surfacing is now on a 300-foot bridge at Pillager," said commissioner Babcock, "and we intend to see that it is put on many other bridges. As a result of the high cost of steel and concrete and the uncertain deliveries some poor jobs have been put over on various counties. With the new bituminous surfacing the wooden bridges become entirely feasible, and counting the depreciation, interest and maintenance, they will cost only half as much as steel and concrete."

War Problems of Pennsylvania Highways.

Harrisburg, Pa.—State highway commissioner J. Denny O'Neil, who recently assumed office, resumed the monthly conferences of the head of the highway department with the fifteen district engineers. These were inaugurated several years ago, but were soon discontinued. He took up with the engineers the question of abnormal conditions now existing throughout the state, the scarcity of labor and the high cost of materials. So far but one contract for new road work has been awarded this year. Chief engineer W. D. Uhler, second deputy George H. Biles and Julius Adler, engineer of tests, were present. It was decided to form several flying squadrons of laborers and move them from point to point in an effort to close up work now under way before the weather breaks. Each engineer was instructed to make an investigation and report upon the advisability of the state opening up stone quarries in various sections.

The commissioner has announced that the highway department is working in co-operation with the National Defense Commission of the United States Government, and that P. M. Tebbs, consulting engineer in the state highway department, had been sent as a delegate to Detroit, Mich., to attend a conference of various state engineers for the purpose of deciding what roads should be maintained as war emergency roads, in order to relieve the freight congestion and to secure prompt deliveries of any supplies that may be required throughout the war. The highway department is now engaged in repairing the Turtle Creek Hill, in Allegheny County, and has also agreed to put a force of men and trucks on the twelve miles of dirt road in Beaver County, running out to the Ohio state line. On account of the car shortage, practically all of the automobiles and trucks for eastern cities are now transported from Cleveland and Detroit over the Lincoln Highway. In addition to these, a line of freight trucks are now running between Dayton and Boston. At a conference in Pittsburgh recently, statistics were produced, showing that approximately two hundred automobiles and trucks would be brought over the Lincoln Highway each day and that by doing so, thousands of freight cars will be released for other uses. Commissioner O'Neil stated that sufficient men and trucks will be kept on the twelve miles of dirt road in Beaver County to keep it open all winter and that snow drifts will be removed promptly, so that this important route will not be blocked at any time.

SEWERAGE AND SANITATION

State Control of Industrial Wastes.

Hartford, Conn.—The recently appointed Industrial Wastes Board is now at work and has decided to take up the various problems in the order in which applications for assistance are received. It is expected that many more calls for help will be received than the limited appropriation will care for. The General Assembly of 1917 passed an act creating an Industrial Wastes Board to be composed of the members of the Public Health Council and five others, two of whom must be manufacturers. The Governor has appointed, in addition to the two manufacturers, two sanitary engineers and the president of the Oyster Growers' Association. This board of twelve representing all interests is charged with the task of solving the problems of stream pollution and taking such action as it deems necessary and feasible to restore the streams to their natural condition. The state health department has said: "All the larger streams of the state and many of the smaller ones are now grossly polluted by both domestic sewage and factory waste. Domestic sewage alone would be a comparatively simple problem, but when combined with industrial wastes of various kinds the problem becomes most complex. Connecticut is an industrialized state, almost every community having its factory or group of factories, and every stream getting its dose of acids, dyes or other chemicals. The state health officials have in recent years studied the stream conditions by survey and analysis—the condition of the water has been ascertained, the points of pollution located and the character of the polluting substances determined, but nothing has been accomplished toward elimination of the pollution. In 1915, authority was given to prevent further pollution, but no funds were provided to carry out the act. This year $25,000 was appropriated for the two-year period and the special board provided to carry on the work. It will be years before any great amount of pollution will be removed from our streams, although from now on each year should show some improvement. There are many who suffer because of stream pollution who feel that health authorities should secure pre-emptory abatement, but it must be remembered that present conditions are the result of small additions covering many years. The municipalities or manufacturers in many instances had little thought as to the ultimate effect upon the streams. A man sewered his house into a nearby stream and it was barely noticeable, his neighbors followed his example and the stream became somewhat objectionable, but when the authorities decided to give the entire community the same privilege by establishing sewers to discharge into the stream its condition became unbearable. A manufacturer after burning his charcoal for years in pits, learns that by using iron retorts he can secure valuable chemicals which formerly escaped in the smoke and gases. The new plant is constructed on the site of the old and the acids and tar wastes from the processes of purification make their way into the nearby stream. In both of the cases cited the pollution is the result of development, and to order pre-emptory abatement would be to do an injustice to the individual and to the community. While the health authorities have never contemplated such drastic action, municipal authorities and owners of industrial establishments have naturally resented the merest suggestion of action that might result in serious inconvenience or possible financial embarrassment. At the same time several of the more progressive cities and manufacturers have, on their own initiative, spent thousands of dollars in an effort to purify or otherwise dispose of their wastes. The Industrial Wastes Board is the result of a complete understanding between the health authorities and the manufacturers and it assures a co-operation that will unquesionably hasten the elimination of the pollution of the streams of our state."

Oil Separators to Protect Sewer Workmen.

New York, N. Y.—Mayor Mitchel has sent a message to the board of aldermen disapproving the proposed amendment to the code of ordinances, eliminating the provision that no garage permit authorizing the storage of volatile inflamable oils shall be issued for any premises which are not provided with an oil separator or other apparatus attached to the house drain for the purpose of preventing such oils from flowing into the sewer. Speaking of the dangerous work of the city's sewer workmen, the mayor said: "I feel that the safety of these men who work daily in the sewers should be considered before oil separators are eliminated. The inconvenience of installing oil separators and their maintenance by garage owners should not be controlling when the lives or health of the city employees may be endangered." The ordinance in question applies only to garages where four or more automobiles are kept. Mayor Mitchel intimated that he would agree to an amendment exempting the outlying districts of the city from the operation of the oil separator law, because in the more sparsely settled districts it might work a real hardship while the danger to sewer workmen from the inflammable oils in those parts of the city was not nearly as great as in the thickly settled sections.

More States Admitted to Birth Registration Area.

Washington, D. C.—Maryland, Virginia and Kentucky are the latest states to be admitted to the registration area for births by the director of the census, Sam L. Rogers. The registration area for birth was established in 1915, and was then composed of ten states and the District of Columbia, representing ten per cent of the territorial extent of the United States, but containing thirty-one per cent of the country's population. For this area the bureau of the census has recently issued its first annual report entitled "Birth Statistics." As the area grows the annual reports will deal with the births in a constantly increasing portion of the country and will therefore become of constantly increasing interest and value. The outlook for a very rapid growth of this registration area is excellent. The need of complete birth registration is recognized now as never before in connection with the military forces. Since war was declared tests of the completeness of birth registration have been made by special agents of the census bureau in Virginia and Kentucky, and both these states secured a rating of over ninety per cent, which represents the degree of completeness required for admission to the area. Similar tests are now being made in Indiana and New Jersey, and before the year is over will be conducted in North Carolina, Ohio, Utah and Wisconsin. Several other states are nearly ready to seek admission, and it is probable that the birth registration will be

more than trebled in size and will contain over two-thirds of the population of the United States. A story is told of one physician who recently became so thoroughly aroused to the desirability of recording births that he reported to the local registrar 450 births which had occurred in his practice since 1900.

WATER SUPPLY

Ask Public Service Commission to Permit Meters.

South Bend, Ind.—The board of public works has petitioned the Indiana public service commission for permission to install a meter system in the waterworks department. The rule was adopted by the works board, but is subject to approval of the state commission before it may be put into operation. The petition alleges that there are 15,000 service connections in the city, 12,000 of which are active. About half of the active service connections are not metered and the rules prescribed by the board of works will place all connections on a metered service by July 1, 1919. The city has been divided into three zones. The first zone must be using the system by July 1, 1918, the second by August 1, 1919, and the third zone by July 1, 1919. The reasons given for the proposed change to the meter rate for all persons using the flat rate are that the two methods permit an unlawful discrimination as to rates, that non-metered water is frequently wasted, causing a higher cost of operation than would be if all services were metered, and that the higher cost of operation in part is unjustly borne by metered service which does not in any way contribute to this wasteful condition. Another reason given is that expansion of the system under the present rate method will be necessary, compelling an additional outlay of money for this purpose, unless the meter system is adopted, which would stop waste and make the capacity of the plant sufficient to supply the demands of the city for several years to come.

Economies Proposed for Capital Water System.

Washington, D. C.—According to Col. W. L. Fisk, Corps of Engineers, retired, in charge of the District water supply system, including the aqueduct and the filtration plant, in his report of operations for the fiscal year ended June 30 last, the average consumption of water during that period was 53,810,000 gallons a day, and the average per capita consumption was 149 gallons a day. In the previous year the average consumption was 51,910,000 gallons a day and the average per capita consumption was 145 gallons a day. The greatest daily consumption during the past year was 68,820,000 gallons, in February, and the next highest was 68,260,000 gallons, in June. The lowest daily consumption was in March when but 39,060,000 gallons were used in twenty-four hours. The safe daily capacity of the system is considered to be 65,000,000 gallons. The maximum capacity of the conduit is estimated at 75,000,0000 gallons and of the filtration plant at 90,000,000 gallons. The purification of the water during the past year is reported as very satisfactory. The average turbidity was reduced from 247 to 0 and the bacterial content from 4.760 to 12 per cubic centimeter. Col. Fisk points out the impossibility of determining in advance the water needs of the district without records as to the consumption in federal buildings, and also the difficulty of fixing the responsibility for the waste of water where large consumers have a wholly unmeasured supply. The estimated cost of completely metering all government services is $32,000 and the district officer earnestly recommends the appropriation of that amount to be immediately available. Attention is invited to the large consumption of water at the government printing office, where the quantity used for the past fiscal year averaged 2,927,400 gallons per day. That large consumption is attributed to the fact that the engines at the office use filtered water for condensing purposes. Various plans are suggested for remedying the situation. One is to furnish the government printing office with power from the central power plant, which will use river water for condensing. Another plan is the installation of a suitable system of cooling towers in the building. Either of these measures, it is said, would apparently reduce the consumption to a maximum of about 550,000 gallons a day. The cost of the water saved, at $2.45 per 1,000 gallons, would be $58.25 a day, or $21,261 per year, and, in addition, Col. Fisk says, the District of Columbia would be saved its present heavy expenses for pumping condensing water through the sewers. Plans are submitted for installing a ten-inch water main across the Key bridge at Georgetown for the purpose of supplying city water to Fort Myer, Arlington cemetery, the naval radio station and the agricultural experiment station.

Waterworks Officials Praised by State Examiners.

Canton, O.—The Canton waterworks department is in a prosperous condition, according to the report of state examiners H. D. Defenbacher and E. A. Moriarty. No findings of any character are made against the department. The report points out the fact that the department had another successful year, the total revenue for 1916 exceeding all expenses by $33,000. The free service rendered during the period covered by the report, from April 1, 1916, to March 31, 1917, was $34,000, while the balance in the waterworks sinking fund was increased by $19,000. "The officials have made this showing possible by conducting the affairs of the department in a careful and business-like manner and deserve special commendation," says the report. Mayor Stolberg has been urging the city water commission that a storage reservoir and a surface water reservoir are greatly needed. He advised a reservoir of 20,000,000 gallons' capacity to reinforce the domestic water supply and urged an impounding reservoir to provide for the storing up of about 4,000,000,000 gallons of surface water for the use of manufacturing establishments. He also says that every individual or company wasting water should be metered and pointed out that the public schools are now using about one-fourth as much water as formerly, simply because meters were installed and charges made for the water used. City clerk W. E. Jackson, secretary of the board, has been instructed by the commission to secure data from every city in the state of between the populations of 50,000 and 200,000, with special reference to a reservoir. Jackson was also asked to get from each manufacturing plant in the city information regarding the well water supplies established by these companies.

STREET LIGHTING AND POWER

Military Authorities Seize Light Plant.

Chillicothe, O.—Military authorities in charge of Camp Sherman, near here, seized the plant of the Chillicothe Electric Railroad, Light & Power Company. Guards with loaded rifles were under orders to permit no civilians near the plant. Fred Bursch, camp electrician, was placed in charge of the electrical supply source. The seizure followed an order from Chillicothe city authorities to cut off the electric light current to Camp Sherman, if need be, in order that Chillicothe street lights might be supplied. The plant has been making an attempt to light both the city and camp. Mayor Cahill sent word to the city engineer to turn off power to Camp Sherman even though it meant no light in the scores of barracks and officers' quarters. Military authorities, under direction of the camp quartermaster, took possession, turned off Chillicothe street lights and turned all power to Camp Sherman. The military police force of the camp was detailed to see that the plant was operated. The guard received loaded guns with orders to shoot if any attempt was made to shut off the military post's electric lights. The arrangement under which the Chillicothe company is furnishing service to the plant is a temporary one, pending completion of a 50-mile transmission line under construction by the Ohio Utilities Company, an associated corporation. When the transmission line which is under construction from a point near Columbus is fully completed both the city of Chillicothe and Camp Sherman will be supplied from this line and the Chillicothe plant will be held as a reserve station. It had been anticipated that the transmission line would be finished on Sept. 10 or 15, but delays in the arrival of materials, even with Government assistance in hastening

shipments, made completion impossible on schedule time. As the requirements for energy for Camp Sherman exceeded preliminary arrangements it was proposed to shorten the street lighting hours in Chillicothe about one hour each evening during the week. No interference with the supply of energy for residences or power for any other purpose than street lighting was anticipated when this arrangement was made.

City Returns to Municipal Ownership.

Menasha, Wis.—This city is now re-engaged in the commercial electric lighting and power service after a lapse of more than two years resulting from legal action taken by the local company to restrain the city from operating its plant. The Wisconsin railroad commission has issued a certificate of convenience and necessity authorizing the operation of the Menasha plant according to the terms of a contract entered into with the traction company and under the supervision of the railroad commission. Work is now under way in making connections with business places and residences. The traction company and the city are working in harmony as a result of the agreement entered into. In cases where the traction company has been supplying light and power and where the patron desires to make the change the city is buying the equipment of the traction company. In cases where the city had already installed service it is only necessary to make a connection with the city power. The same is true where the prospective user has never been a patron of either the city or the traction company.

City Appeals in Lighting Assessment Case.

Niagara, Falls, N. Y.—The city council has directed corporation counsel Moore to take an appeal to the appellate division from a decision of justice Sears of the supreme court, holding that local lighting assessment No. 3—levied against Main and Third street property owners to pay one-half the cost of the ornamental lighting system—is null and void. Mr. Moore said that if the Sears decision stood he did not believe those property owners who had paid their assessment could recover what they had paid. He said the contractor had already been paid for the work. The court held that in the year 1914, when the board of public works authorized and directed the improvement in question to be made, the charter then in force did not recognize street lighting as a local improvement and no local assessment therefor could be made. It held that if it be assumed that the so-called Home Rule Act authorized such local assessments, the improvements would have to be made in accordance with the terms of the charter then in force. It held that this was not done as the board of public works omitted to bring the matter of the improvement before the common council. This omission rendered all of the acts and proceedings, initiating and authorizing the improvement to be made, null and void.

FIRE AND POLICE

Reorganization Follows New Leave Schedule.

Portland, Ore.—The new schedule of one day off duty in each four days instead of one day off in each six for all members of the fire bureau is now in effect. With the inauguration of this arrangement, truck company No. 5, engine company No. 11 and engine company No. 16 were disbanded, as a result of the general reorganization of the fire bureau. The plans provide for the elimination of 23 horses and at least 15 firemen, and it is believed by commissioner Bigelow and the board of fire chiefs that the change will not impair the general efficiency of the fire fighting force of the city. The firemen are elated over the order granting them more time off duty. The abandonment of the station at Twelfth and Powell streets, engine company 11, will leave a large, thickly settled territory without full fire protection. In the reorganization, the auto apparatus will be shifted so as to cover additional territory. The most important change in this direction is the placing of an auto engine in the station in Sellwood. The situation will be closely studied and if more changes for the reduction of expense may be made without impairing the service they will follow in the future. There was a difference of opinion among the firemen as to what time their leaves should start. Some were in favor of having their 24 hours off duty begin at 7 p. m. and end at the same hour the following day. Others preferred being off duty from 8 a. m. to the same hour the following day. Commissioner of public affairs Bigelow ordered a vote taken in the various company stations on the question to settle the contention, with the result that 21 companies voted for the leave to start at 7 p. m., 16 voted for the leave to begin at 8 a. m., and the other company could not arrive at a decision. Commissioner Bigelow ordered the lay-off to begin at 7 in the evening.

Firemen's Pension Law in Colorado.

Denver, Col.—The firemen's pension law recently passed by the Colorado legislature has been construed by attorney-general Hubbard. The attorney-general held that it could be made effective in cities or towns which had created a board of trustees for pension administration, consisting of the mayor, treasurer, city clerk and one member of the fire department, which had filed the names of these trustees with the secretary of state, and which owned fire apparatus or equipment to the value of $1,000 or more. The town's fire department may be either paid or volunteer, according to the opinion.

Police and Firemen Get Raise.

Mansfield, O.—Mansfield police and firemen are to receive an increase of 15 per cent in salary. The new figures are to become effective as soon as law allows and both departments are to be strengthened by the addition of a new office, to be known as assistant chief, according to legislation passed by city councilmen. The increase in salary comes after police and fire department heads, on the sanction of safety director Hughes, had told members of the county budget commission their departments would be shattered by resignations unless higher wages were paid the men. Under the conditions of the increase, patrolmen and firemen will receive $85 monthly for their probation period and $92 thereafter; lieutenants will receive $97.50; captains, $103.50; assistant chiefs, $109.25; and chiefs, $115.

Install Negro Fire Company.

Los Angeles, Cal.—The city council has instructed the fire commission to install a company of negro firemen in the engine house at Fourteenth street and Central avenue. The members of the whole company now stationed there will be distributed among the other companies of the city where vacancies exist. There are 24 vacancies now in the fire department, due to enlistments and selection for service. The civil service commission has a large number of eligibles on its list, but it is said that none of the white eligibles is willing to accept any of the positions, which were merely for the term of the war. On the other hand, of the 51 negro eligibles, a large number are willing to take employment in the department on the conditions offered. There is a good deal of reluctance to mixing the men, as this plan does not seem to have worked out well, according to some of the department officials, and the only alternative was to form a separate company. The engine-house at Fourteenth and Central is in the midst of a negro neighborhood, and it is not believed that any serious objection to the location of a colored company there will be forthcoming. The only member of the council who opposed this plan was councilman Farmer. His objection was based largely on the fact that a removal of the white company at this location will necessarily compel a derating of some of the white officers, and on the further ground that there are no negro eligibles for engineers on the civil service list. He does not believe that the placing of white engineers in a negro company is likely to work out well. The civil service commission has two lists of eligibles for the fire department—one white and the other negro. The commission insists that this was done at the request of the negro men themselves a few years ago, but on the other hand some of the negroes contend that it has opened the way for a great deal of unjust discrimination against them on the part of chief Eley and others in the department in the matter of appointments.

GOVERNMENT AND FINANCE

Philadelphia Sells Big Bond Issue Over Counter.

Philadelphia, Pa.—The city treasurer has sold within a week a $7,275,700 bond issue over the counter. The issue was of 4 per cent, thirty-year bonds and were sold at par in the city hall. The Sinking Fund Commissioners bought $1,500,000. Great public confidence was expressed by purchasers and the city officials were highly gratified at the results of the sale. Mayor Smith subscribed $2,500. There were many small and out-of-town buyers. On the first day of the sale $3,016,800 worth of bonds were sold.

Votes Against Tax for Publicity.

Tallahassee, Fla.—The city has voted down a half mill tax for publicity purposes by a majority of 26 votes. A bill providing for such a tax passed the last legislature with a referendum clause, and now the people at the polls have expressed themselves against it.

Harrisburg's Many Mayors.

Harrisburg, Pa.—So far as is known no city of the third class in the east can equal Harrisburg's mayoralty record for the last six months. Mayors to the number of four have served the city since April 1. In April Mayor Ezra S. Meals died. City clerk Charles A. Miller was appointed. Mr. Miller died on June 12. William L. Gorgas, a member of council, became acting mayor. The courts named J. William Bowman to serve until a mayor is elected in November. The successful candidate in the election will be Harrisburg's fifth mayor in less than eight months.

City Wants County to Raise Taxes.

Toledo, O.—The city has filed a mandamus suit against the county auditor in the state supreme court. The purpose is to force the auditor to certify a full five-mill tax levy for the city, as provided by a city ordinance. The prosecutor advised the auditor not to grant the request, as it would be in violation of the Smith one per cent law, and then the auditor notified the city law director of his refusal. Assistant prosecutor Seney went to Columbus to ask the attorney general to assist him in the case, for the reason that the action is one of importance to all cities operating under the charter form of government.

City Manager Plan Involved in Election.

Altoona, Pa.—Altoona will have a chance to vote on the city manager form of government at the polls in November. In the recent primaries William S. Westfall, Charles H. Cassidy, John P. Lafferty, and N. Augustine Stevens, each of whom has pledged himself to pay $2,000 of the $2,500 salary which the councilmanic office carries toward the salary of a city manager in event of his election, were nominated. W. C. Myton, Ira J. Shelley, George W. Kohbler and John Frank E. Rooney, none of whom favors the city manager plan, in so far as giving up a part of the prospective councilmanac salary is concerned, are the other four on the November ticket, so that the issue is clear cut. While the vote was light the day's campaigning was spirited, the city manager proponents being out in force to insure the selection of their candidates in the final eight.

Railway Company Tax Valuation Upheld.

Trenton, N. J.—The New Jersey Board of Taxes and Assessment has sustained the action of the Mercer County Tax Board in fixing the assessment of the Trenton & Mercer County Traction Corporation for 1916 at $2,069,903. The city of Trenton and six other municipalities in which the company operates had fixed the original assessment at $2,189,440, but the company asked that it be reduced to $1,041,972. The state board stated that its duty under the law was to ascertain the market value of the property as of May, 1916, and that in dealing with the class of property concerned it would consider original cost, reproduction cost, depreciation, etc., as elements in estimating market value. The board said that its chief engineer had appraised the physical property at $1,500,851, and that a reasonable allowance for going value, or "that value which attaches to the property as the result of the unity of its ownership and use and its established system of successful operation," would be $569,052, the difference between the value fixed by the county board and the physical value.

STREET CLEANING AND REFUSE DISPOSAL

Hog Yards Forced Out of City.

Council Bluffs, Ia.—East Omaha's hog ranches, established to consume Omaha's garbage, have been ordered away by the city council. After listening to complaints of residents of the exclusive Carter Lake club district, who said that the south winds wafted an almost unbearable odor from the hog yards through their homes, the council instructed the health officer to see that the ordinances forbidding the feeding of hogs within the city limits be enforced to the letter. This means that that part of East Omaha which lies within the corporate limits of Council Bluffs shall not be the location of any hog feeding ranches, and those now doing business there must get out. This includes a 10-acre tract given over entirely to the feeding of garbage to hogs. On this land Carl Lorensen, who has a contract with the city of Omaha to remove all the garbage from a certain district, has established quite an extensive plant, capable of handling several thousand hogs. He personally pleaded with the council not to legislate him out of business, stating it would cause him a heavy loss, as he was bonded to fulfill his contract with the Omaha council. The council took decisive action to forestall any attempt to locate a hog ranch outside the city limits of East Omaha but in such a location as to annoy Carter Lake residents by passing an amendment to the present garbage ordinance making it unlawful to haul the stuff from outside the city, meaning Omaha, through Council Bluffs streets. This last action was taken when it became known that an Omaha company contemplated establishing a feeding yard which did not lie within East Omaha but was just over the state line in Nebraska. So situated, it would still permit an offensive odor to float toward Carter lake.

Utilizing Garbage from Cantonments.

Washington, D. C.—The Food Administration has made public the following: "The War Department has taken elaborate and comprehensive precautions to prevent waste in the Army cantonments, which will soon contain more than 2,000,000 men, and in the embarcation camps. In the feeding of the men waste will be minimized through the fact that the food will be prepared under the direction of mess cooks, who will be trained by special courses in Army cooking schools. The Food Administration has received from the Secretary of War an announcement of a thorough-going plan for conserving all the waste material of the National Army camps, which will result in salvaging many thousands of dollars. The Army's first consideration in planning this work has been the sanitary and hygienic problem. At each cantonment the wastes will be collected and transported to a single 'transfer station' under the direction of the sanitary inspector. Through the use of the two-can system wastes will be tightly inclosed throughout their collection. Sterilized cans will be substituted for the filled cans at the kitchens, the nuisance of disagreeable odors and danger from flies being reduced to a minimum. Every step in the process of reclamation and utilization is carefully safe-guarded and is under the absolute direction of a sanitary force, each contractor being placed under heavy bonds. At the transfer station the wastes are turned over to a contractor, who will remove them to a point at least 3 miles distant from the reservation. There the wastes will be completely sorted. Bottles will be sterilized and sold for commercial use. Tin cans will be baled and the solder, tin, and iron reclaimed. Paper, which is estimated at about 5 tons per day, will be baled. Bones will be kept separate and ground for fertilizer. The hides of dead animals will be removed

and the carcasses 'reduced' for grease and fertilizer. The chief items of waste will be the garbage and the manure. It is estimated that there are 1,200 animals at each cantonment, producing 120 tons of manure per day. At the rate of the report the manure from 11 cantonments had been sold for $240,900 annually. The greatest element of saving is through the garbage. This has been sold for an annual price of $446,394.50. The garbage from 13 of the cantonments will be used for feeding swine. It is estimated on the basis of experiments conducted at the Chillicothe cantonment that the garbage waste from 10 to 15 men will feed one hog and and enable it to add to its weight 1 pound per day. At this rate the garbage from these 13 cantonments will produce 18,980,000 pounds of pork per year. When not used for feeding, the garbage will be 'reduced,' that is, cooked at high temperature, the grease extracted, and the remainder ground and used for fertilizer or feeds. By the method of incineration formerly in use, not only would all these valuable waste materials have been destroyed, but it would have cost approximately $700,000 for the installation of incinerator plants and an annual charge of approximately $595,000 for their operation. When we add to this saving the amount annually received by the Government from these wastes, the net saving the first year amounts to $1,707,840. The effect of this new plan, therefore, is not only to conserve large quantities of valuable food wastes, fertilizer, etc., but to turn into a large profit what has hitherto been a very considerable expense."

Economy Empties Garbage Cans.

Sioux City, Ia.—There has been a decrease in the garbage gathered by the thirteen garbage men of the city to the amount of forty tons a month. The biggest point of economy exercised by the housewife is in the saving of bread, according to Mike Carrig, head of the garbage collection department. "It is very seldom that we now see whole loaves of stale bread and stale rolls which used to appear frequently in the cans before the United States entered the war," asserted Carrig. "Also I have noticed that the potato peelings and the parings of other vegetables are thinner and show less waste than formerly existed." The garbage gatherers are taking up from 300 to 500 pounds less garbage a day than they did three months ago. The city produces about 35,000 tons of garbage a year, which includes the garbage collected by the gatherers employed by the city and the garbage of men who collect it for their own private use in feeding pigs. The city probably would go into the pig feeding business if the people of the city would use two garbage cans instead of one in caring for their garbage, according to mayor R. J. Andrews. "It is necessary that one can be used for rubbish and another used for the garbage which comes from the kitchen," said the mayor. "The garbage which comes from the kitchen could be very profitably used in feeding pigs, but the city could not consider a plan of this sort until the people are educated to a point of using two garbage cans. There is an ordinance now in effect which provides for the use of two garbage cans, but it is almost impossible to enforce it. People, as a rule, resent the instructions from city officials as to the use they should put their garbage to, and there are some, who, if they thought there could be any money made by the preservation of garbage, would not tolerate helping the city unless their own pocketbooks received some tangible benefit."

TRAFFIC AND TRANSPORTATION

Cities Oppose Six-Cent Fare Order.

Hartford, Conn.—Beginning Oct. 1, the Connecticut Company of New Haven raised the fare on all its lines throughout the state from 5 cents to 6 cents. The increase of 1 cent, or 20 per cent, it was estimated, would net the company an annual additional revenue of $1,730,000, based on its revenue from passenger fares during the last year. The company's statement follows: "Effective Oct. 1, 1917, the rate of fare will be increased to 6 cents. To relieve passengers of the necessity of carrying the coins necessitated by this change in fare, seventeen tickets will be sold for $1 at the local office. This increase is necessary because of the alarming increase in the cost of performing transportation service as well as the need for increased revenue to enable the company to finance the increasing demands for improvements of all kinds. The conditions at present confronting the company show that the present rate of fare is no longer reasonable, and it is clearly the duty of those charged with the conduct of the business to establish a reasonable rate of fare, which, after careful consideration, has been decided to be 6 cents. Some time ago the Connecticut Company announced that it intended to cancel the practice of giving six tickets for 25 cents in Waterbury, and following a protest by the city, which held that the cancellation of the tickets was actually an increase in the rate of fare, the case was taken to the Superior Court. The court ruled that the company had a right to cancel the practice of selling the reduced-rate tickets. The increase affects 692 miles of road and more than 35 cities, among them the following: Hartford, New Haven, Bridgeport, Greenwich, Waterbury, Meriden, Stamford, Norwalk, South Norwalk, Berrien, Noroton, Rowayton, Westport, Southport, Naugatuck, Fairfield, Milford, Orange, Shelton, Derby, Ansonia, Branford, Wallingford, Middletown, Glastonbury, Manchester, Rockville, Stafford Springs, New Britain, Windsor, Plainville, Winsted and Torrington. The mayors of Stamford, New Haven and Bridgeport have been in communication and have presented the situation to their councils. It is expected that the cities will officially unite to protest to the public utilities commission.

Arbitrate in Municipal Car Strike.

Monroe, La.—The strike of the employees of the municipal street railway has been ended by arbitration. The strike was a protest on the part of the union against the action of the city government in voting to adopt one-man cars. The men held that their contract with the city called for a motorman and a conductor on each car. Pending arbitration of whether the intent of the contract between the city and carmen is for two men on each car, service was resumed on the one-man plan. Also pending arbitration, the men will receive a flat rate of 30 cents an hour, instead of 22 to 27 cents as heretofore. All the striking employees were reinstated with seniority rights.

Jitney Regulation in Indianapolis.

Indianapolis, Ind.—The city council has approved an ordinance regulating jitney buses. It provides that no more than the comfortable seating capacity of the car shall be carried, based on the designated seating capacity of the model of car used. A license is fixed at $10 for cars seating five passengers, $15 for cars seating seven passengers, and $25 for cars seating twelve or more passengers. Jitney operators must also file indemnity bonds providing for damages not exceeding $2,500 for one person and $5,000 for any one accident. The ordinance also provides that the route to be followed must be designated, and that this route cannot be changed until the operator has filed a notice of the new route with the city controller. The driver must charge a 5-cent fare unless the amount is specified by a large sign displayed on the front of the car.

San Francisco May Buy Railways.

San Francisco, Cal.—While the strike of the employees still continues, although service is slightly improved, the public utilities committee of the board of supervisors has unanimously adopted a resolution recommending that the city purchase the property of the United Railroads if equitable terms can be obtained. On the previous day a committee of citizens and bankers who compose a committee to reorganize the finances of the company presented a proposal to the city providing for the appraisal of the physical property and the purchase of it by the city on the instalment plan. It was proposed that the city agree

with the company on a year to be taken as a fair measure of net earnings, or that an average of five years' net earnings be taken and this sum paid by the city each year for every year of the franchise. This method would involve no bond issue, but would be carried out by a charter amendment approved by the citizens and the legislature. Such a charter amendment election cannot legally be held until July 19, 1918, according to an opinion by the city attorney. The valuation of the railroad property is now being made by the state railroad commission, but it is thought that this value will not be used under the proposed plan of municipalization.

MISCELLANEOUS

Completing Work on Quebec Bridge.

Quebec, Canada.—After the fatal collapse of 1907 and the accident of 1916, work is now being completed on the famous Quebec bridge after the successful placing of the huge suspended span. While it is not expected that the final work can be ended before the close of the year, it is hoped that trains may be able to use the new bridge within a few weeks. The hoisting system has been dismantled and work has been begun on the flooring of the span and the footwalks. The hoisting of the span was dramatic and watched by thousands during the four days. The span was built and erected in the same way as the one lost last year. Many records were made. The span was the greatest individual fabricated piece, the heaviest ever floated and the heaviest ever jacked, and with the longest lift. The span structure weighs 5,400 tons and it was floated 3½ miles on scows. By the aid of hydraulic jacks and lifting links it was raised a total of 150 feet. Work was done only during the day. The span was carried on six scows and floated out at early morning by two tugs and a strong tide. The ends were fastened to the lifting chains and within two hours the scows came free and the span hung clear while the spectators watched with breathless interest. The jacking continued for three days, the upper links of the hoisting chain being let down as they came up. Only one minor accident occurred which slightly injured one workman and caused a half hour delay. When the last of the eight pins was driven with a few easy taps the whole river and bridge resounded with whistling and cheering which was taken up by every bell and automobile horn in the city of Quebec.

Administration of Federal Fuel Regulation.

Washington, D. C.—The federal organization to control the coal supply is being developed in every state, county and city. The fuel administrator has chosen a representative of the Fuel Administration in each state and territory. He will also appoint in each state, in conjunction with the state representative, a committee of citizens who, with the representative, will assume direction of the regulation of the sale of coal in that state. No person will be appointed, either as a state representative or on any of these committees, or any of the committees mentioned below, who is connected with the local coal industry. Each state representative, as soon as appointed, will choose a committee of citizens in each county of the state and in each city in the state having more than 2,500 population. The state representative and the state committee are chosen directly by the fuel administrator with the approval of the President. The county committees and the city committees will be chosen directly by the state representative. The state committee will at once ascertain the amount of coal in the state available for use during the coming winter and the amount of coal needed to meet any deficiency in the supply, based on last year's consumption. It will be the duty of the various committees to ascertain and report to the fuel administration the reasonable retail margin (the cost of local distribution and a reasonable dealers' profit to be allowed). This margin, when duly fixed by order, together with the cost at the mine named by the President, the transportation charge and the jobbers' commission, when sold to a jobber, will constitute the price to the consumer. The fuel administration will make public from its local committees in each community sufficient data to enable the individual consumer to ascertain for himself the established price. These figures will be compiled with relation to local needs in order that the fuel administration may, if necessary, apportion the supply of coal with careful regard to the greatest existing needs. There are many communities in which there is no supply of coal available at retail prices. A very large proportion of the coal supply available for the coming winter is under contract. These contracts, which are allowed to stand for the present, were made prior to the President proclamation and very largely limit the amount which may be placed on sale at retail prices based on the Presidents' order. It is absolutely essential, however, says the fuel administration, that a sufficient amount of coal be put on the market at once at these prices to meet the needs of domestic consumers. The fuel administration believes that this supply of coal can be made available by voluntary arrangement between the operators and those with whom they have contracts, and thus make it unnecessary for the fuel administration to exercise or recommend the powers, the exercise of which is provided in the Lever act.

To Vote on City Planning.

Spokane, Wash.—Spokane's voters will ballot at the municipal election in November on the proposition of organizing a city planning commission. Commissioner Fassett's ordinance providing for the submission of this question to the voters has been passed as an emergency measure by the city council. The ordinance purposes to change the charter to provide for the appointment by the city council of a commission of ten men to serve without pay, who will act as an advisory board in the city's physical growth and development; the designing of public buildings; naming and numbering of streets, the solution of housing problems and various other questions for the benefit of the city and its people in general.

Fort Smith Is One Hundred Years Old.

Fort Smith, Ark.—Heralding "the greatest celebration that has ever been attempted in the southwest," Fort Smith is to welcome its hundredth birthday in a lively week from Oct. 8 to 13. All friends and neighbors are invited to take part in the attractive program. The first day will be devoted to "Fort Smith as She Is Today"; the second will be "Industrial and Agricultural Day"; the third will be "Historical Day," with a parade reproducing the city's history in miniature floats; the fourth will be celebrated with the coronation of the king and queen of the centennial; the fifth will be "Fraternal Day" and the week will wind up with a "Grand Finale." Big carnival features; electrical and automobile parades; a realistic attack on old Fort Smith by a band of Indians; prize agricultural displays; band concerts and numerous other amusements are promised.

Condemnation and Bond Issue to Get Civic Center.

Baltimore, Md.—With new authority in the form of another ordinance passed recently by the city council for the acquisition of property for the proposed civic center, the mayor and city council, through city solicitor Field, have filed condemnation proceedings for several pieces of property. The proceedings instituted recently constitute a reopening of the fight between the property owners in the proposed civic center and the mayor and city council. While some of the property has been acquired without a fight by the city, several of the owners of the larger tracts have served notice that they proposed to hold on to their property as long as possible. In the former fight, in which the city lost, the ordinance under which proceedings were instituted delegated the authority to purchase and acquire property to the board of estimates. Judge Bond held in that case that the board of estimates had no right to condemn property because it was not a governing power, but merely an advisory board. To overcome this objection a new ordinance was passed in which the power to purchase and condemn property was given to the city solicitor. This new ordinance also adds three additional blocks to the proposed civic center, which is now bounded by Lexington, Gay, Fayette streets and the Fallsway. This will,

therefore, make the civic center extend from the Fallsway to the city hall. Steps toward allowing the voters to decide whether the Civic Center, St. Paul street and other contemplated park improvements shall be made at this time were taken when the council passed an ordinance authorizing the issuance of the $3,000,000 park loan authorized by the General Assembly of 1908. By the terms of the ordinance the stock will be redeemable on November 1, 1957, or 40 years from next November; that it shall be issued in sums of not less than $100 and shall bear interest at not more than 4 per cent, to be paid semi-annually. It will not be a burden on the taxpayers, as the sinking fund and interest provisions must come from the park tax paid by the United Railways and Electric Company. It is provided that $35,400 shall be paid into the sinking fund each year in addition to the interest. The park board will have control of all expenditures, as it is stipulated in the measure that all subsequent ordinances for improvements to be paid for out of the loan shall be referred to and approved by the Board of Park Commissioners. The ordinance is broad and liberal in stipulating the uses to which the money may be put. It will be submitted to the voters at the November election.

Denver Leases Coal Mines.

Denver, Colo.—The city has met with an instant response in its plan of selling at cost coal from three mines leased by the city. Within the first three days 1,300 tons were ordered by consumers and about a thousand families have availed themselves of mayor Speer's plan. Commissioner George A. Levy is at the head of the coal department and deliveries have been rapid. Four offices are in operation for the receipt of orders. Only those families of moderate means who would find difficulty in meeting the high prices of retailers are to be served at present and the price is $4.15 a ton. The city has made contracts with operators of three lignite mines. The city has shipped machinery and other material necessary to the development of some of the mines in the northern fields, so that the output may be increased without further delay. These advances on the part of the administration are refunded beginning with the first carload of coal shipped from the mines, on a royalty basis, according to commissioner Levy. This will obviate the necessity for large financial investment and insure the rapid development of the mines, all of which are producing more than 100 tons a day at this time. All of the contracts for coal were entered into with independent miners, and the city has arranged to purchase the output at a stated figure a ton at the mine. The contract for delivery will relieve the city of establishing municipal yards at this time, and shift some of the responsibility of actually filling the orders to one. The provisions of the contracts, therefore, relieve the city from actually going into the business of mining at this time, or of actually delivering the coal with city teams, but give the consumer the advantage of obtaining coal at the actual cost price.

Evansville's Coal Yard in Action.

Evansville, Ind.—Mayor Bosse has opened a municipal coal yard near the C. & E. I. freight depot, where he will later sell coal from the recently leased municipal coal mine. Walter Korff of the waterworks is in charge. Orders are taken for delivery to consumers at 14½ cents, which figure is based on the price of $2.20 at the mine, as set by President Wilson. Coal at this price will mean a saving of 75 cents on each fifty bushels, as the price charged by regular dealers is 16 cents. Mayor Bosse expects to have a supply of about 100 tons a day. The coal will all be first class and union-mined. It will be furnished by the C. & E. I. and the E. & I railroads, coming from mines along their lines in the Evansville section, having been contracted for by the mayor in advance. The mayor declared he was not going to keep from getting coal cheap for the people, even though it may be his municipal mine will not be in operation this winter. Borings for the mine are about completed. The mine is located just above Chandler, Ind., 12 miles northwest of the city. The mayor is going to build it with his own money, then sell it to the city to be operated by the water works department. The mine will be sold to the city at cost 6 per cent interest on the original investment. Just now the city cannot take over the mine, because its charter and the Indiana laws do not permit a city to operate its own coal mine. But Bosse declares he will fight for a new law to permit municipal operation of the mine. The legality of mayor Bosse's plan for the city to own and operate a coal mine will be left for the Public Service Commission of Indiana to decide. The mayor instructed city attorney John R. Brill to prepare a petition to the commission embodying all details of the proposed municipal mine. The layout of the mine has been inspected by state mine inspector Michael Scolland and his deputy, John Wright, and they gave it their approval, complimenting the mayor on his venture. The mine will produce 1,000 tons of coal a day. It will have the most modern equipment. Coal will be shipped to the city on a traction line and a railroad. Municipal coal yards will be established on each of these lines in Evansville. The coal will be sold at wholesale and retail at slightly above cost. The city will arrange to haul it to the house of the buyer.

Federal Food Administration Favors Municipal Markets.

Washington, D. C.—The Food Administration recently gave out the following announcement: "The committee representing the live-stock producers which has been sitting in Washington for some days, has formulated a series of recommendations to the Food Administration on the meat question. One of the principal recommendations in the report stated that the main hope of reducing the price of meats lies in the establishment of municipal markets, because the greatest expense in meat handling occurs with the retailer."

City to Build Summer Resort Cottages.

St. Louis, Mo.—The city will build cottages this winter on the banks of the Meramec River and establish a summer resort for people of small means who may lease the cottages for short periods at nominal rental, it was announced by director of public welfare John Schmoll. Director Schmoll has inspected the sixty-acre tract a mile below Valley Park which G. A. Buder, an attorney, presented to the city a year ago to be used for recreation purposes. The plot of ground is on the river, and will afford an excellent swimming beach, director Schmoll said, after a deposit of about 2 feet of mud is removed. It is about sixteen miles from the city, on the Frisco and Missouri Pacific railroads, and can be reached in about forty-five minutes for a fare of 12 cents if commuter tickets are purchased.

New Housing Law in Effect.

Lansing, Mich.—All cities of over 10,000 population in the state are affected by Michigan's new housing code which recently went into operation. The law was passed at the last session of the legislature. It is the aim of the new law to eliminate fire hazards and to improve sanitary conditions. It is now unlawful for a person to erect a building of more than three stories without using fireproof materials. All apartment or tenement houses more than one story high must have at least two independent ways of egress, extending from the ground floor to the roof. They must also have fire escapes from each story if more than one story high. Flat roof apartments of more than two stories must have in the roof a scuttle or bulkhead of not less than two by three feet in size. In multiple dwellings of three or more stories there must be at least one flight of stairs extending from the main floor to the roof, and the stairs and public hallways must be at least three feet wide and clear of obstruction. Furthermore, all stair halls must be enclosed on all sides with walls of brick not less than 8 inches thick. Dumb waiters and elevators in all multiple dwellings must be enclosed in fireproof shafting. Inside cellar stairs must be enclosed in fireproof walls and must have fireproof selfclosing doors at the base. It will be unlawful to erect a wooden multiple building of more than two stories in height and no more than two families can live above the first floor. No existing wooden buildings can be altered to provide for more than two families above the first floor. No dwelling can be altered in such a way that its light or ventilation would be reduced without approval of health officers.

NEWS OF THE SOCIETIES

Calendar of Meetings.

Oct. 10.—UNION OF BRITISH COLUMBIA MUNICIPALITIES. Annual convention, Duncan, B. C. Secretary, Ex-Reeve H. Bose, Survey Center, B. C.

Oct. 15-17.—NATIONAL HOUSING ASSOCIATION. Annual conference, Hotel La Salle, Chicago, Ill. Secretary, Lawrence Veiller, 105 East 22d St., New York City.

Oct. 15-17.—NATIONAL ASSOCIATION FOR STUDY AND PREVENTION OF INFANT MORTALITY. Annual meeting, Richmond, Va. Secretary, Gertrude B. Knipp, 1211 Cathedral street, Baltimore, Md.

Oct. 16-19.—LEAGUE OF KANSAS MUNICIPALITIES. Annual convention, Wichita, Kan. Secretary, Homer Talbot, University of Kansas, Lawrence, Kan.

Oct. 17-18.—LEAGUE OF MINNESOTA MUNICIPALITIES. Fifth annual convention, St. Cloud, Minn. Secretary-treasurer, Richard R. Price, University of Minnesota, Minneapolis.

Oct. 17-19.—AMERICAN PUBLIC HEALTH ASSOCIATION. Annual meeting, Washington, D. C. Acting Secretary, A. W. Hedrick, 126 Massachusetts Avenue, Boston, Mass.

Oct. 22-24.—AMERICAN CIVIC ASSOCIATION. Annual meeting, St. Louis, Mo. Secretary, Richard B. Watrous, 914 Union Trust building, Washington, D. C.

Oct. 28-30.—TEXAS CONFERENCE ON SOCIAL WELFARE. Annual convention, Houston, Texas

Nov. 19-24.—CITY MANAGERS' ASSOCIATION. Annual meeting, Detroit, Mich. Secretary, W. L. Miller, City Manager, St. Augustine, Fla.

Nov. 20-21.—ASSOCIATION OF GOVERNMENTAL RESEARCH AGENCIES. Third annnal meeting, Detroit, Mich. Secretary, C. O. Dustin, Statistical Bureau, Red Cross War Council, Washington, D. C.

Nov. 20-23.—PLAYGROUND AND RECREATION ASSOCIATION OF AMERICA. Recreation Congress. Secretary, H. S. Braucher, 1 Madison Ave., New York, N. Y.

Nov. 21-24.—NATIONAL MUNICIPAL LEAGUE. Twenty-third annual meeting, Hotel Statler, Detroit, Mich. Secretary, Clinton Rogers Woodruff, 703 North American Bldg., Philadelphia, Pa.

Jan. 15-17.—VIRGINIA GOOD ROADS ASSOCIATION. Seventh annual convention, Richmond, Va. Secretary, C. B. Scott, Richmond, Va.

Feb. 6-13.—FIRST CHICAGO CEMENT MACHINERY AND BUILDING SHOW. Supersedes annual Chicago Cement Show. Held at the Coliseum, under direction of the National Exhibition Co.

March 17-24.—PAN-AMERICAN CONGRESS ON CHILD WELFARE, Montevideo, Uruguay. Secretary, Edward N. Clopper, 105 East 22d Street, New York, N. Y.

National Housing Association.

The Sixth National Housing Conference is to be held at Chicago October 15 to 17. The headquarters of the conference will be at the Hotel La Salle, where all of the meetings will be held. The conference will be under the auspices of a number of civic and social service organizations of the city. Some of the features of the preliminary program are given here.

Following registration and the official opening and addresses of welcome, there will be presented a brief report by the secretary, Lawrence Veiller. A round-table luncheon will be held in the Grand Ballroom, at which will be heard three-minute reports of progress of the year from the delegates. At the afternoon session the topics to be treated will be, "The Real Estate Men and Housing," by Fred G. Smith, chairman housing committee, National Association of Real Estate Boards of Minneapolis; and "How Can We Cheapen the Workingman's Dwelling?"

At 8 p. m. the subjects to be discussed will include: "Industrial Housing; What Employers Have Done to House Their Employees in the United States," by Leifer Magnusson, special agent United States Bureau of Labor Statistics; "Housing as a Factor in Reducing Labor Turnover; How One City Grappled with Its Problem of Industrial Housing," by William H. Ham, manager of the Bridgeport Housing Company, Bridgeport, Conn.

On Tuesday morning, October 16, there will be held two section meetings. Section A, on "Construction," will discuss "The Best House for the Small Wage Earner," by Richard Henry Dana, Jr., of Murphy and Dana, architects, New York; and "What Is the Best Size Lot?" Section B, on "Health," will hear addresses on "What City Department Shall Enforce Housing Laws—the Health Department or the Building Department?" by James F. McCrudden, chief division of housing and sanitation, health department, Philadelphia, Pa.; and "Organizing the Work of a Health Department—What One City Has Done: Detroit," by Henry F. Vaughan, assistant health officer, Detroit.

After luncheon there will be a discussion of "Chicago's Housing Problems." At 2.30 p. m. there will be an automobile trip through the city, showing recreation and small park systems and housing conditions.

At 8 p. m. there will be a session on the question of "The Housing of the Single Worker," at which the following subjects will be taken up: "Bunk Houses, Boarding Houses and Labor Camps," by W. B. Engelkraut, camp inspector of the Pennsylvania Railroad; "The Housing of the New Army," and "City Hotels for Workingmen."

On Wednesday morning the two sections on construction and health will again meet. At the former will be taken up "The Harm Done by Inflated and Speculative Building" and "Ready-Made Houses," by John E. Conzelman, Unit Construction Company, St. Louis. At the health section meeting will be discussed "The Modern Science of Ventilation as Applied to Dwellings," by E. V. Hill, M. D., of the Chicago health department; and "Wall Beds—Shall They Be Suppressed or Regulated?"

Luncheon will be held with the Chicago Association of Commerce. "The Zoning of Cities" will be the subject of addresses by Lawson Purdy, president board of taxes and assessments, New York, N. Y., and Thomas Adams, commissioner of Conservation, Ottawa, Canada.

At the afternoon session at 3 p. m. the subjects to be discussed will include "Organizing the Housing Work of a Community" and "The After-Care of a Housing Law," by Mrs. Albion Fellows Bacon, Evansville, Ind.

The evening session will begin with a banquet in the Grand Ballroom. "Housing and Industry" and "Housing and Education" will be the subject of addresses by speakers to be announced later.

The secretary and director of the association is Lawrence Veiller, 105 East 22d street, New York, N. Y.

Southern Appalachian Good Roads Association.

Henry Roberts, president of the Southern Appalachian Good Roads Association, is now perfecting the program for the ninth annual convention of this association, which will be held in Nashville, Tenn., October 16, 17, 18 and 19.

At the convention next month President Roberts will advocate a plan for the taking over of the main arteries of travel in the several states by the state governments, these roads to be maintained out of state funds. A bill has already been drafted to put this plan into effect in Virginia, with practical assurance that the same will be done during the session of the next legislature. Mr. Roberts will urge all other states in the jurisdiction of the association to adopt a similar plan. The proposed legislative act to provide for this will provide that roads proposed for state ownership must be brought to a definite standard in all the counties through which they run. This will have the effect to stimulate the various counties in completing unfinished links and improving the state highways proposed for state ownership, as such roads will not be accepted except in conformity to the standard required.

The convention will open with a welcome address by Governor Thomas Rye on the evening of October 16. Henry Roberts, president of the association, will make response to the welcome.

Among the subjects to receive attention of highway engineers and authorities of the south and the federal government at this convention will be national and military highways; federal and state aid; maintenance; convict labor; road financing; concrete, brick and bituminous roads; closer co-operation between states in highway plans, and standardization of highway work.

Among the speakers will be John Craft, of Mobile, president of the Alabama Good Roads Association, whose subject will be National Military Highways; A. D. Williams, of Charleston, chairman of the State Road Commission of West Virginia, who will discuss Co-operation and Standardization. Other speakers on the various subjects will be C. B. Scott of Richmond, assistant highway commissioner of Virginia; W. S. Keller of Montgomery, state highway engineer of Alabama; X. A. Kramer of Jackson,

state highway commissioner of Mississippi; J. C. Batchelder of the American Automobile Association, Washington, D. C.; Rodman Wiley of Frankfort, state commissioner of public roads in Kentucky; A. M. Nelson, state highway engineer of Tennessee; J. J. Murray, secretary of state highway department of Tennessee; Judge Arthur Crownover of Winchester, chairman of the Tennessee highway commission, and Tom Rye, governor of Tennessee.

Washington County Commissioners and Engineers

Seattle was unanimously chosen as the next convention city of the county commissioners and engineers by the 1917 convention, in session in Spokane, Sept. 6-8. The commissioners of the counties will be guests of Seattle for the first time in August, 1918.

"Washington now ranks third in the roster of the states in importance of its highways," said Chairman Claude C. Ramsay, of the King county board of county commissioners, upon his return Saturday from the convention in Spokane. "Washington has spent $50,000,000 in road construction in the last twenty years. This expenditure and the roads which have resulted from it have put us in third place."

Responses to the address of welcome were made for the commissioners by W. S. Coe, secretary-treasurer of the commissioners' association, and J. D. Neville, president of the engineers.

Dr. A. E. Stuht, Spokane county physician took the liberty of changing the subject assigned slightly in rendering his paper, to describe the results secured at the Edgecliff county tuberculosis sanitarium, instead of discussing proposed state control for the institution in the state.

George F. Cotterill, chief highway engineer, also delivered an address upon state highway policy, following which the two divisions separated. Engineers listened to technical discussions by H. J. Doolittle and Professor M. K. Snyder upon engineering problems.

Cambria County Good Roads Association.

Another indication that business men in close touch with conditions do not regard the war as an excuse or a reason for the false economic policy of holding up improvements is given in the action of the Cambria County (Pa.) Good Roads Association, an organization representing the interests of every section of the county. The association recently passed resolutions advocating the immediate building of a 60-mile permanent road system of brick or concrete, tapping every populous section of the county.

The resolutions outline the road system, advocate a bond issue of $1,500,000 to cover the county's share of the cost, and urge that the work of making preliminary surveys be started immediately and actual construction next spring. The county commissioners have pledged themselves to make the surveys as soon as petitions are in from the supervisors of the various townships affected.

Northwest Electric Light and Power Association.

About 200 electric light and power men of western and northwestern states and British Columbia attended the tenth annual convention of the Northwest Electric Light and Power Association, held at Spokane, September 12 and 15. The visitors were welcomed by C. M. Fassett, city commissioner of public utilities, and M. C. Osborn, of Spokane, president of the association, responded.

Measures for national defense and a study of the safety code of the federal bureau of standards were advanced in the report of hydro-electric and technical committee as most important for the consideration of electrical engineers. The report was submitted by J. C. Martin, of Portland. J. E. Woodbridge, engineer for the Pacific Coast division of the National Electric Light Association, representing the California delegates, indorsed the report of the committee.

A technical paper by J. C. Ralston, of Spokane, and a discussion by Lewis A. McArthur, of Portland, were included in the program.

PERSONALS

Alvord, John W., C.E., of the firm of Alvord & Burdick, consulting engineers, Chicago, has been appointed by Governor Lowden, of Illinois, as a member of the Illinois State Board of Natural Resources and Conservation. Other members of the board are: Prof. Thomas C. Chamberlain (geology), Prof. John M. Coulter (biology) (both of the University of Chicago), Prof. William A. Noyes (chemistry), Prof. William Trelease (forestry) (both of the University of Illinois). Mr. Alvord is to advise on water resources. President Edmund J. James, of the University of Illinois, is ex-officio member and chairman of the board. The board is appointed under the new Civil Administrative Act, and is expected to study the resources of the state, the work of its departments under the lines indicated, and advise the Governor and the Legislature from time to time on matters in which the welfare of the state may be promoted. The members of the board serve without compensation.

Board, Pat C., city manager of Charleston, W. Va., has resigned on account of private work, and has been succeeded by M. J. McChesney, city engineer.

Carnine, W. A., has been appointed highway commissioner of Polk County, Nebraska.

Francisco, E. O., who was assistant professor of civil engineering at the Agricultural and Mechanical College of Texas dring the last session, has been commissioned a second lieutenant in the Engineer Officers' Reserve Corp and has been ordered to Ft. Leavenworth.

Greer, J. W., of Beeville, has been elected city manager of Bryan, Tex., succeeding W. Pipperman, who resigned to enter the officers' training camp at Leon Springs.

Powell, W. J., assistant city engineer of Dallas, Texas, has been appointed a captain in the Engineer Reserve Corps.

Shuey, Arthur F., has been appointed superintendent of the Tampa, Fla., waterworks.

Vorse, C. S., of Des Moines, has been appointed assistant to the county engineer of Pottawattamie County, Iowa.

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

Parsons, Pa., is making some STREET IMPROVEMENTS. The engineers for this work were Paxon & Morgan.

A SEWAGE DISPOSAL PLANT to cost $40,000 is to be built by Cardington, Pa., plans and specifications being prepared by A. F. Damon.

In making some SEWERAGE IMPROVEMENTS, Hillsboro, Ill., has had the consulting engineering services of the Warren Engineering Company.

Clarke County, Athens, Ga., is to make DRAINAGE IMPROVEMENTS. The engineer for the work is W. D. Alexander.

Cuyahoga Falls, O., is extending its SEWERAGE SYSTEM. The engineer consulted for the work was R. Winthrop Pratt.

A WATER SUPPLY dam is proposed for Electra, Tex. The city has retained to investigate and report on the project Henry Exall Elrod.

In making PAVING IMPROVEMENTS, the borough of Hughestown, Pa., consulted E. H. Coward.

Millstadt, Ill., is to build a municipal ELECTRIC LIGHT PLANT. The Fuller-Coult Engineering Company has been consulted on this proposal.

Wabasha, Minn., is to extend its SEWERAGE SYSTEM according to plans and specifications prepared by J. F. Druar.

In making a number of SEWERAGE IMPROVEMENTS, Antioch, Ill., has had the consulting engineering services of H. L. Emerson.

The Belvue, Kan., drainage district, in making DRAINAGE EXTENSIONS, has the engineering services of V. R. Parkhurst.

SEWER IMPROVEMENTS are to be made by Fayette City, Pa. Plans and specifications for the work were made by the South Penn Engineering Company.

NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

G M C SAMSON TRACTOR.

With Sieve Grip Wheels and Other Valuable Features.

One of the outstanding features of design and construction which has made for the successful operation of the G M C Samson tractor is the sieve grip wheel. This is clearly shown in the accompanying illustration. This type of design, used on all the three wheels, makes the tractor easy to handle on all kinds of roads and soils, and should therefore prove especially effective in road work.

The motor of the tractor is four-cylinder, four-cycle, with tractor type "L" head cylinders, cast en bloc. The cylinder heads are removable. Bore is 4¼ inches, stroke 6¾. The crank shaft is of drop forged chrome nickel steel, heat treated and specially balanced. There are three large bronze backed babbitted bearings. The connecting rod bearings are bronze and babbitt. The cam shaft is one-piece drop forged steel, heat treated. There are three liberal bearings of cast bronze.

The fuel system is gravity feed from cylindrical tank of terne plate, with capacity of 24 gallons. The carburetor is Marvel "E" 1¼ inch. The air intake is through a patented cleansing device, eliminating danger of dust and grit entering motor. Ignition is by Eiseman G-4 waterproof, high tension, fixed spark magnetos.

Lubrication is by combination force and splash system. The cooling system consists of radiator, centrifugal water pump and fan. The radiator is built up with upper and lower tanks and vertical side members of semi-steel—vertical tube fin core. The capacity of the system is 10 gallons. The 19-inch, four-blade fan is driven by a 2½-inch flat leather belt.

The clutch is of the internal expanding type, operated by hand lever, giving positive action. Speeds are one forward and one reverse, controlled by hand lever. Gears are in constant mesh. The speeds range from 1½ to 3½ miles per hour—at 924 r. p. m. of the motor the tractor speed is 2¼ miles an hour. The brakes are of the external contracting type, operated by foot pedal, with brake located on jack shaft. Steering gear is worm and sector type, operated by 15-inch hand wheel.

The frame is of channel steel, reinforced; reinforcements and draw bar angles are hot riveted. The front wheel is 28 inches in diameter, 15 inches wide, with guide rein in center of tread; sieve grip; roller bearings. The rear wheels are 40 inches in diameter, 18 inches wide; sieve grip; roller bearings.

The rating is 25 brake hp., at 650 r. p. m. The over-all length is 160 inches; over-all width, 64½ inches; over-all height, 56 inches, and weight, 5,200 pounds.

The G M C Sampson tractor is now a product of the General Motors Truck Company, Pontiac, Mich.

FIRING DOOR.

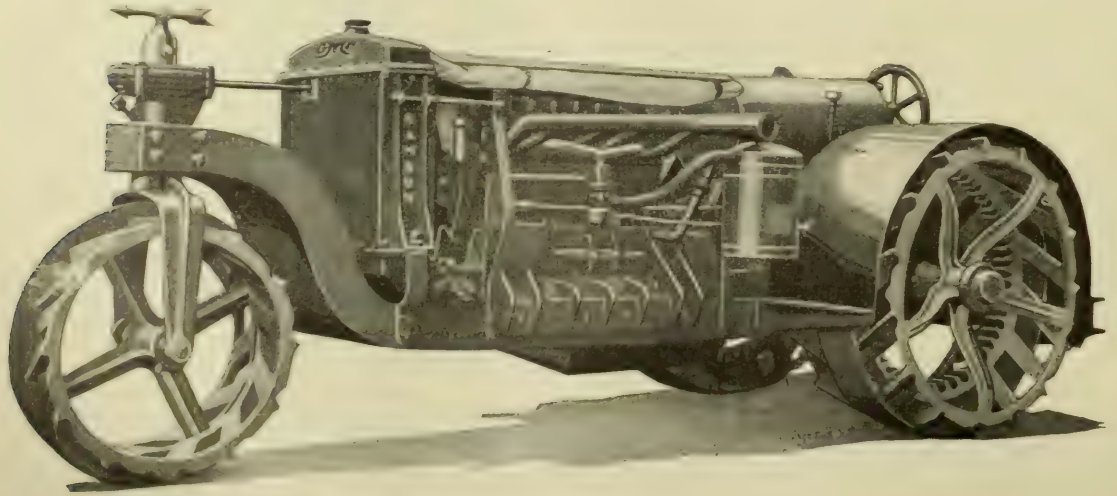
Cokal Device for Fuel Economy and Smoke Prevention.

In these days of our exorbitant-priced and unreliable fuel supply and the conservation movement, municipal power plants and waterworks are making many improvements which will reduce their fuel costs. The elimination of smoke is also becoming an important problem in many cities. For these two purposes of economy and smokeless operation the Cokal firing door for furnaces has been developed.

The principle aimed at in the use of the device is that of complete combustion. The coking method, which is recommended by the United States Bureau of Mines, is employed rather than the usual spreading method. The coal is first coked so that coke and gas are burned rather than "raw" coal. The heat ordinarily lost by radiation through the fire door is utilized in driving gas from coal, thus preparing it for complete combustion. The prevention of smoke is thus more easily accomplished.

The Cokal door is pivoted at the bottom. In order to feed coal (to be coked) it is only necessary to turn the crank and lower or tilt the cokal door enough to allow the coal in the hopper to fall into the V space between coal being coked and the front of the door. Turning the crank in the opposite direction forces the coal into the furnace and breaks the coal already coked. Heat in the furnace drives gas from the coal at the furnace front slowly, or rather in direct proportion to the intensity of the heat in the furnace. This process of distillation continues so long as any gas remains in the coal placed in the front of the furnace and so long as there is heat. After the gas has been driven from the coal the coke may be pushed to the back of the grate in order to maintain a very hot fire at that point. More coal is admitted to the furnace by means of the Cokal firing door and the volatile matter driven off must necessarily pass over the incandescent coke bed and be consumed.

A number of advantages are thus claimed for the Cokal door. Coal is fed into the furnace without the usual loss due to open fire doors, and there is no harmful in-rush of cold air. Coal is dried in the hopper so that the moisture, which would otherwise use up valuable furnace heat, is easily and economically eliminated. The door



G M C SAMSON TRACTOR (Showing Motor and Sieve Grip Wheel Construction)

may be used to advantage with undergrate boilers, and the steaming capacity of boilers is greatly increased. The combination of Cokal firing doors with forced draft (with or without damper regulation) is claimed to act as an ideal hand-operated stoker, with results similar to those obtained from the more expensive mechanically operated stokers. The Cokal door can be lowered to horizontal position for cleaning fires.

The cut on the next page shows the Cokal firing door attached to the fire box boiler in position for cleaning fires, and the drawing shows a sectional view while the coal is being pushed in. In normal position the door is all the way towards the furnace, and before firing all the way front, so that the V space is filled with coal from the hopper. The Cokal door is made by the Economy Furnace Appliance Co., 38-52 West Division Street, Chicago, Ill.

INDUSTRIAL NEWS

Cast-Iron Pipe.—It is expected that the recent price regulation of iron ore, pig and finished products will have an effect of lowering prices very soon. Prices, however, still remain at their former high level. Quotations: Chicago, 4-inch Class B and heavier, $68.50; 6-inch, $65.50. New York, 4-inch, Class B and heavier, $68.50; 6-inch, $65.50. Birmingham, 4-inch, Class B and heavier, $63; 6-inch, $60; Class A, $1 extra.

The Badger Meter Manufacturing Company, Milwaukee, Wis., has been awarded the contract for furnishing the water department of Kansas City, Mo., with five thousand water meters.

Sloan, Huddle, Feustel & Freeman, consulting engineers, Boston and Chicago, have removed their general offices at Madison, Wis., and their Chicago office in the People's Gas Building, to the Conway Building, Chicago. Mr. William F. Sloan has personal charge of the Boston office, which is located at 14 Kilby street, Boston, Mass.

Regulation of Iron and Steel Prices.

The President has approved an agreement between the war industries board and the steel men, fixing the following prices, which become effective immediately, and are subject to revision January 1, 1918, as follows:

Commodity	Basis	Price agreed upon	Recent price	Reduction—Amount	Reduction—Per cent.
Iron ore	Lower Lake ports	[1]$5.05	[1]$5.05	...	...
Coke	Connellsville	[2]6.00	[2]16.00	$10.00	62.5
Pig Iron		[2]33.00	[2]58.00	25.00	43.1
Steel bars	Pittsburgh	[3]2.90	[3]5.30	2.40	47.3
	Chicago				
Shapes	Pittsburgh	[3]3.00	[3]6.00	3.00	50.0
	Chicago				
Plates	Pittsburgh	[3]3.25	[3]11.00	7.75	70.5
	Chicago				

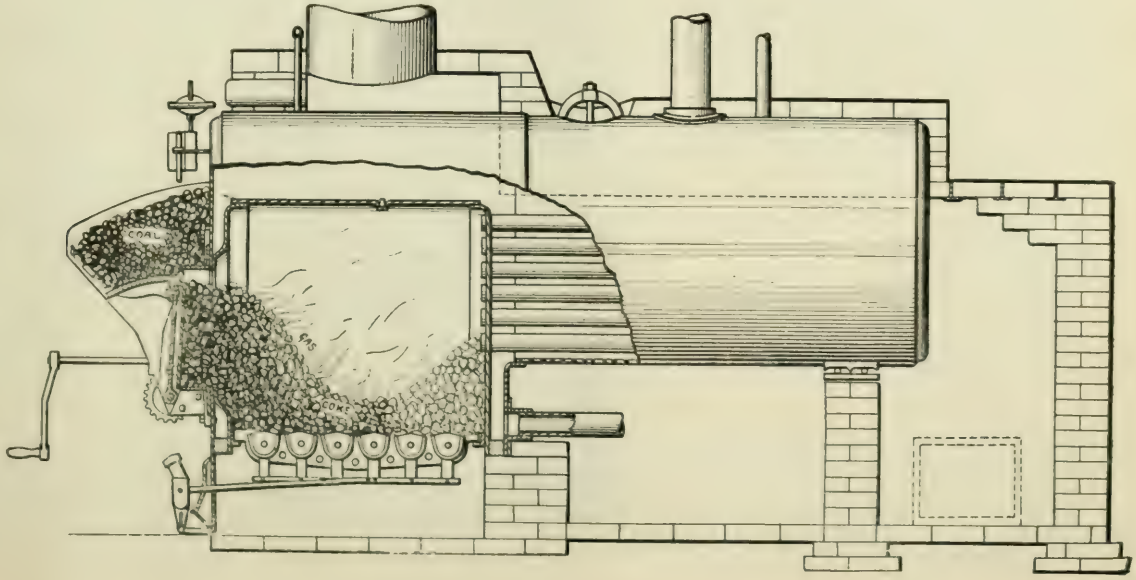
[1]Gross tons; [2]Net tons; [3]Hundredweight.

It was stipulated, first, that there should be no reduction in the present rate of wages; second, that the prices above named should be made to the public and to the allies, as well as to the Government, and third, that the steel men pledge themselves to exert every effort necessary to keep up the production to the maximum of the past so long as the war lasts.

Measures will be taken by the war industries board for placing orders and supervising the output of the steel mills in such manner as to facilitate and expedite the requirements of the Government and its allies for war purposes, and to supply the needs of the public according to their public importance and in the best interest of all, as far as practicable.

The Standard Asphalt and Refining Co., Chicago, Ill., has purchased the plants, trade-marks and good-will of the **Sarco Petroleum Products Co.** The Cities Service Company of 60 Wall Street, New York City, is the new interest back of this company, although the management remains essentially the same as before the change. Mr. Charles Muller, who was an executive of the former company, now becomes manager. He has been associated with the old company for ten years, and has risen through the ranks to his present position and is well known in business and financial circles in Chicago. Mr. Robert F. Trumbull has been promoted to be manager of the Railway and Building Material Department. He has been in the service of the old company for eight years in this department. The indications are that the new company will be much more active than the old, and that its facilities for serving the trade will be greatly increased, due to the extensive control of crude materials possessed by the Cities Service Company.

Priority in Iron and Steel Orders.—The priorities committee of the war industries board of the Council of National Defense has made public the contents of its first general priority circular, giving instructions as to priority in orders and work for all individuals, firms, associations and corporations engaged in the production of iron and steel and in the manufacture of products thereof. About 25,000 copies of the circular have been sent to manufacturers in all parts of the United States, requesting them hereafter to observe the regulations, giving priority in accordance with certificates to be issued by the committee. The circular is signed by Judge Robert S. Lovett, chairman, and



SECTIONAL VIEW OF COKAL FIRING DOOR (Coal is being pushed into furnace).

is approved by the Secretaries of War and the Navy.

Under these regulations all orders and work are divided into three classes: Class A, comprising "war work; that is to say, orders and work urgently necessary in carrying on the war, such as arms, ammunition, ships, etc., and the materials required in their manufacture"; Class B, comprising orders and work "which, while not primarily designed for the prosecution of the war, yet are of public interest and essential to the national welfare, or otherwise of exceptional importance"; Class C, comprising all orders and work not embraced in Class A or Class B. All orders henceforth will be classed as Class C unless covered by certificates of the priorities committee. No certificates will be issued for Class C orders.

Orders and work in Class A will take precedence over those in Class B, and both these classes will be given priority over Class C, irrespective of the date the orders were received. Class A and Class B will in turn be separated into subdivisions to be designed as Class A1, A2, A3, A4, etc., and Class B1, B2, B3, B4, etc., each composed of orders within the class which are regarded respectively as of greater moment and to be given precedence in accordance with its serial number. All materials required in the manufacture of an article or in prosecution of any work will be entitled to take the class of such article or work unless otherwise specified.

For the administration of the regulations certificates will be issued by the priorities committee upon application specifying the classification of the order of work. Certificates of a subsidiary nature will be issued upon request for the furnishing of material and articles required in manufacturing the article or prosecuting the work ordered.

Applications for Class A certificates will be made to the committee by the contracting officer or agency of the United States, or, in the case of the Allies, by their authorized agent. Applications for subsidiary certificates covering materials, articles, or work required in the manufacture of Class A products will be made by the contractor to whom the principal Class A certificate has been addressed.

Applications for Class B certificates will be made to the committee by the individual, firm, or corporation for the expedition of whose contract the priority order is desired; while subsidiary certificates for materials will, as in the case of Class A certificates, be applied for by the contractor to whom the principal Class B certificate has been addressed.

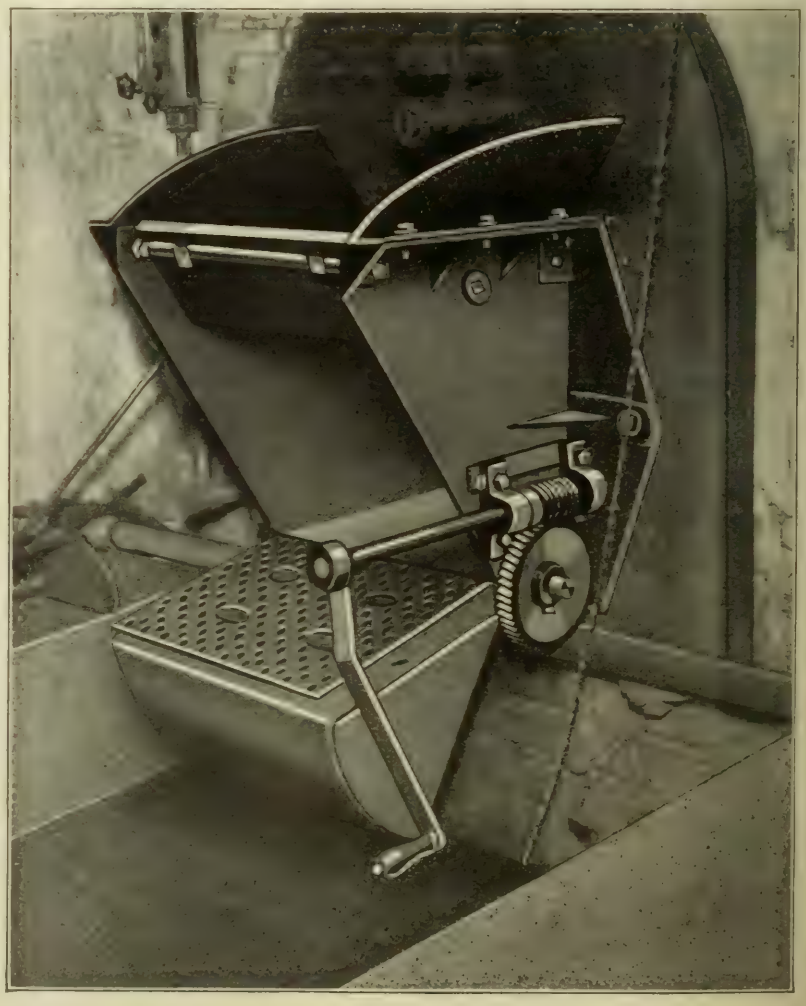
The priorities committee is composed of Robert S. Lovett, chairman; Major-General J. B. Aleshire, George Armsby, Rear-Admiral N. E. Mason, Edwin B. Parker, J. Leonard Replogle, and Rear-Admiral A. V. Zane. R. T. Dempsey is executive secretary.

Walter A. Zelnicker Supply Company, 325 Locust Street, St. Louis, Mo., has just issued for general and immediate distribution a new catalog, Bulletin No. 220, entitled "Dollars at Work." This should prove of great value to contractors and city officials in the market now, or soon, for construction supplies. The catalog covers, among other things, rails, locomotives, steel piling, tanks, air compressors, hoists, boilers, cranes, pumps, generators, motors, steam shovels and machinery of all kinds.

Production of Lead.

The United States Geological Survey, Department of the Interior, has undertaken a midyear canvass of lead production, the results of which have just been tabulated by C. E. Siebenthal. For convenience of comparison half the corresponding qualities for the 12 months of 1916 are inclosed in brackets. The output of domestic desilverized lead, excluding desilvered soft lead for the first six months of 1917, was 152,231 short tons (158,235), the output of domestic soft lead, including desilverized soft lead, was 124,292 tons (117,879) and the output of lead produced from foreign ores and bullion was 29,539 tons (9,453). In view of the scarcity of lead, the increase in lead of foreign origin is very encouraging. The greater part came from Mexico. According to the records of the Bureau of Domestic and Foreign Commerce, the total lead imported in the first six months of 1917 was 30,620 tons (17,665) of which 22,507 tons came from Mexico (12,099), and 4,569 tons came from Canada (3,153). The exports of domestic lead amounted to 29,241 tons (50,283) and of foreign lead 6,066 tons (4,940). The lead used in articles exported with the benefit of drawback was 3,270 tons (2,585). Thus the total exports of lead were 38,577 tons (57,808). Disregarding stocks, the apparent consumption of lead in this country in the six months was 268,952 tons (230,587). The production of new antimonial lead was 7,822 tons (12,019), and of secondary antimonial lead 1,959 tons (2,065). The output of secondary pig lead by regular ore smelters was 7,578 tons (5,548). The average outside spot price of lead during the six months' period was 9.9 cents a pound, as against 6.9 cents in 1916.

The Worthington Pump & Machinery Corporation, 115 Broadway, New York, N. Y., has issued a new bulletin, No. W-600-A, which describes and illustrates the Worthington volute centrifugal pumps.



COKAL FIRING DOOR IN POSITION FOR CLEANING FIRES.

Municipal Journal

Volume XLIII. NEW YORK, OCTOBER 11, 1917 No. 15

LAYING STEEL WATER MAIN IN ST. LOUIS

Thirty-six Inch Pipe Line Delivering Direct From Pumping Station to Low Service Reservoir—Machinery Used for Excavating and Backfilling—Detailed Cost of Work—Machine Trenching at House Services.

BY W. E. HARDENBURG.

BACK-FILLING MACHINE AT WORK IN ST. LOUIS.

The city of St. Louis has just installed the first large steel water main laid in the middle west. The chief factor in the decision of the Board of Public Service to use steel pipe was the cost, it having been estimated that $40,000, in round figures, would be saved by using steel instead of cast iron.

The main, which is 26,670 ft. long, connects Compton Hill reservoir, in the south central part of the city, with Bissell's Point pumping station, on the Mississippi river at the northern outskirts of the city; the object being to insure a more certain and continuous supply to the reservoir.

The St. Louis distribution system is divided into a high service and low service, the pressures in which differ by from 20 to 40 pounds, according to the distances from their respective pumping stations. The low pressure system is supplied from the Bissell's Point pumping station and the high pressure from the Baden station, which is about three miles north of the Bissell's Point station. The two systems are interconnected at certain points, but the connecting links are closed by valves. By opening one or more of these valves, high pressure can be furnished to sections of the low pressure districts, and this has been done often in periods of heavy consumption when the friction in the mains of the low service system reduced the pressure in certain parts of that district to an undesirably low point. This feeding of the low pressure from the high reduced the pressure in the latter system by an average of 30 lbs., but with the facilities then existing no other method of relief seemed possible.

During the day time the supply in the low service system came partly from the pumping station and partly from Compton Hill reservoir, and there were then points on several of the mains that drew equally from both, and it was at these points where the minimum pressure existed. As the consumption along each line varied from time to time these points of minimum pressure changed their location. There is, however, a section of the city south of the reservoir which received most, if not all, of its supply from the reservoir alone.

Although there were several lines connecting the pumping station and the reservoir, only one 36-inch main led directly between the two, and this was drawn upon by the mains of the distribution system and even this main failed to deliver any water into the reservoir during hours of high consumption. Also, the mains

leading from the pumping station to and through the distribution system had not sufficient capacity and this necessitated too high pressure at the pumping station. To make possible the delivering of water into the reservoir and the operation of the pumps at lower pressure was the purpose of the pipe main referred to herein.

This main was laid along the most direct practicable route between the pumping station and the reservoir and is primarily a pumping main. It was constructed of lock-bar steel pipe supplied by the East Jersey Pipe Corporation, and was delivered in 30-ft. lengths, coated, and wrapped with burlap to protect the coating. Each length was subjected to a pressure of 300 lbs. to the square inch, made at the point of manufacture by the inspectors of the Board of Public Service. The maximum pressure that it was expected the pipe would be called upon to withstand was 125 lbs. per square inch.

The cost of the pipe alone was approximately $7.20 per foot and that of pipe and appurtenances in place was $9.80 per foot. The difference between the cost of steel and cast iron was about $1.50 per foot, and it was believed that this saving in first cost out-balanced the advantage of the longer anticipated life of cast iron pipe.

The contract for laying the pipe was awarded to the Inland Construction Co. of St. Louis, and work was commenced in August of last year at Bissel's Point and carried continuously south to the reservoir. The contractors' equipment included a No. 3 Austin trenching machine; a Curtis two-cylinder, single-acting air compressor driven by a 30 h. p. Foos gas engine (10½ by 18 inches), with a capacity of 200 cu. ft.; an air reservoir consisting of a steel tank 6 ft. by 30in. in diameter; a Novo back-filler driven by a 10h. p. one-cylinder gas engine, and small appliances, including No. 80 Boyer riveting hammers and a number 2X round Keller chipping and caulking hammer, used in caulking, operating at an air pressure of about 90 lbs. A portable blacksmith's shop and office were maintained on the work. A 3-legged derrick of the form employed in laying cast iron pipe was used in laying the steel pipe.

MAP OF ST. LOUIS, SHOWING HIGH AND LOW PRESSURE DISTRICTS.
High pressure districts are shaded; low pressure, unshaded. Lines show mains 20-inch and larger supplying low pressure district.

The soil formation encountered was mostly clay, and in this material rapid progress was made. The trenching machine excavated 20,160 lineal ft. of trench, or approximately 28,500 cu. yds. in 596 hours, an average of 34 ft. per hour. The nature of the soil in which the machine operated did not vary enough to produce any appreciable difference in the rate of excavation. In operating the machine there were employed 1 superintendent, 1 fireman, 1 engineer and 4 laborers. An additional crew of about 35 laborers was used in removing the top pavement, including brick, granite and concrete, in advance of actual machine operations, and 4 teams were used to remove the surplus excavation. The total cost was as follows.

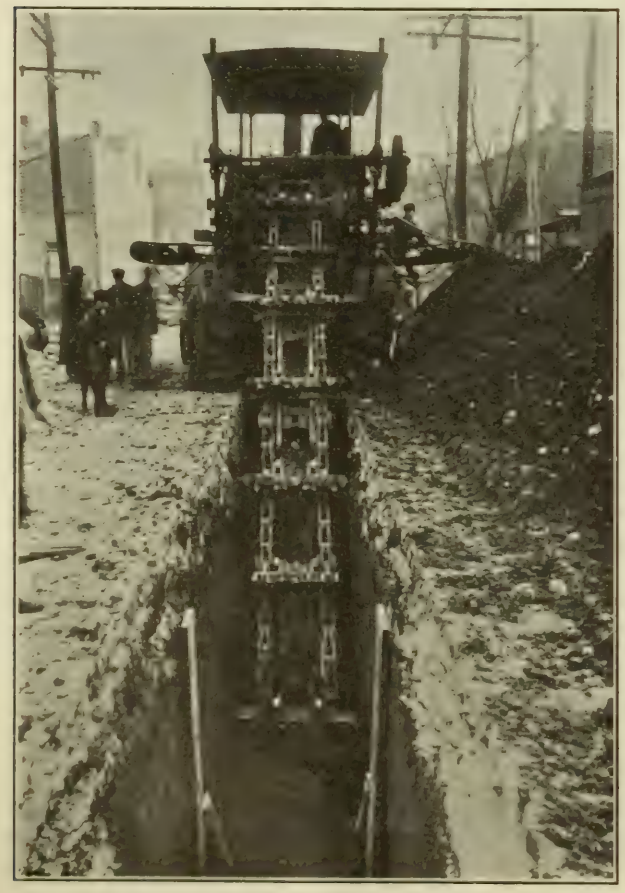
Machine Crew:			
Superintendent, 28 weeks at	$30.00		
Fireman, 28 weeks at	15.00		
Engineer, 28 weeks at	24.00	.....	$1,932.00
Common labor, 3,883 hours at	.33 1-3	.....	1,294.33
Auto trucks (hauling surplus dirt), 740 hours at	2.00	.....	1,480.00
Team, 2,177 hours at	.56	.....	1,219.12
Total			$5,925.45

This gives an average cost per yard of excavation of 20.7c.

No separate account was kept of the back-filling, but this and the bell hole digging, tunnelling and hand excavation were all included together under the head of hand work, which totaled as follows:

Foreman, 4,784 hours at	$ .56	.....	$2,739.04
Common labor, 102,114 hours at	.33 1-3	.....	34,038.00
Water boy, 1,818 hours at	.14	.....	254.52
Back-filling engineer, 786 hours at	.40	.....	314.40
Teams, 2,722 hours at	.56	.....	1,524.32
Auto trucks, 129 hours at	2.00	.....	258.00
Total			$39,128.28

This hand work included 6,647 lineal ft. of trench, or



EXCAVATING TRENCH FOR 36-INCH PIPE.

approximately 11,700 cu. yds. of clay excavation removed by hand.

The back-filling was done partly by means of a Novo back-filler, the crew consisting of one engineer to operate the machine and two laborers to hold the back-filling slip. Digging for water and gas service connections was done by hand. A cross trench was dug at each service and it was cut and removed until the trenching machine had passed, when it was reconnected. A small amount of rock was encountered and here the usual slow process of drilling and blasting was employed.

The greatest difficulties were encountered in streets where other pipe lines already existed. In many places stretches of sewer, water or gas pipes had to be removed and relaid to make room for the new main; in other places the alignment or grade of the steel pipe was altered. The pipe was laid at a depth ranging from 7 to 12 ft., the general average being about 9½ ft. In connecting up the lengths of pipe, 47,900 rivets were driven, 2000 seams were caulked and 1,911 joints were

30-FOOT LENGTH OF 36-INCH STEEL PIPE LOADED FOR DELIVERY FOR ST. LOUIS PIPE LINE.

riveted. The bends in the line were made with special riveted sections, usually such as to require but one field joint. The plates for the straight pipe were 5/16-inch thick, while those for the riveted bends were 7/16-inch. After riveting, the ends of the plates were caulked and the joints thoroughly cleaned both inside and out, and given a thick application of a protecting material known as Sarco and the outside of the joint was then covered with burlap. Connected to the main were 17 fire hydrants, 18 blow-offs, 23 manholes and 14 36-inch flanged valves with by-passes. These valves were spaced at approximately equal intervals along the line, and the section between each two successive valves was tested for leaks before it was back-filled. A connection was made between this line and the high service pumps so that, by opening or closing two valves, the line may receive water from either high pressure or low pressure pumping station. Eight air and vacuum valves, ranging in size from 4 to 8 inches, were set at the high points of the line.

The contract was to have been finished in May of this year, but was not completed until July, the delay being due chiefly to failure to complete at the time intended certain repairs that were being made to the reservoir. (See Municipal Journal for Sept. 6th.) F. L. Bock, assistant engineer of the Distribution Section, was in general charge of the work, under the direction of Edward E. Wall, water commissioner.

FRUIT TREES FOR SHADING HIGHWAYS.

State Highway Commissioner J. Deny O'Neil of Pennsylvania has instructed the various county engineers and superintendents of highways to endeavor to interest residents along the various state roads in the planting of trees along the roads. His idea is not only to add to the pleasure of using the roads, but also to make the trees serve a utilitarian purpose, as is done in some European countries, by planting trees that are fruit or nut bearers. His first choice would be oxheart cherries, which he says are highly ornamental and will grow to large size but will not give a shade so dense as to keep the sun from drying up muddy roads. His next choice would be the apple tree. If purely shade trees are used, he advises the sugar maple or red oak.

These trees, he said, should be planted not more than a foot outside the fence line, in order that the roads may be widened later without destroying the trees; this being especially important at curves, which the state expects in the near future to make wider than the rest of the road.

SHEET ASPHALT ON COUNTRY ROADS

The First Sheet Asphalt Road Constructed by a County In New Jersey—Telford Macadam Base Removed and Concrete Base Laid.

Work is now progressing on the construction of 16,100 ft. of sheet asphalt surface on a concrete base on the Camden-Moorestown pike, N. J. This is believed to be the first sheet asphalt road constructed by a county in New Jersey. It is being laid by Burlington County on a road which carries fast and heavy motor traffic, but not much steel-tired traffic. The specifications call for a 1½-inch wearing surface of sheet asphalt on a binder course 1 inch thick and a 5½-inch concrete base mixed 1:2:4.

The contractors on the work, Sutton & Corson of Ocean City, N. J., are experiencing the usual troubles that are bothering contractors this year—difficulty in getting men, even at an exorbitant price, and trouble and delay in the delivery of material. The restricted space in which the work is being carried on—an electric railway track is laid on each side of the road—makes the use of hand labor necessary to a large extent, while work is sometimes delayed because of the necessity of maintaining railway traffic. Short hauls make the use of motor trucks costly, so teams are used on all transport work. Poor siding and unloading facilities are another factor. Sand is now being unloaded by hand, but it is hoped to take advantage of a coal elevator later on.

The old road is constructed with a telford base of coursed trap blocks, about the size and shape of Belgian blocks, which were laid about 40 years ago by a turnpike company. These are very firmly set and the problem of removing them has not yet been satisfactorily solved. On top of this foundation course is a wearing surface of waterbound macadam, which, though badly rutted and worn, must be removed before the blocks can be reached. Under the blocks is a loose loam, easy to handle.

Several methods are being tried for removing the blocks. A rooter plow, drawn by a steam roller, has oper-

MAKING A 6-INCH CUT AFTER REMOVING TELFORD BLOCKS.

ated fairly well and by this method the macadam top is removed at the same operation. The rooter plow loosens the blocks so that they can be loaded by hand into wagons and leaves the road loosened so that excavation to grade is easy. Owing to the severe character of this work, delays due to breakage are rather frequent. Removing the blocks with bars and picks would be slow and costly and has not been tried. Recently a Keystone excavator has been tried on this work, but sufficient data have not yet been secured to determine whether or not it will operate successfully. A slat bottom has been placed on the bucket, the idea being that the blocks will be retained on the slats, but that the earth and the old macadam stone will fall through, allowing the blocks to be torn up and loaded into the wagons at one operation.

After the blocks have been removed, it is necessary to excavate the road only slightly to bring it to grade, the amount varying from 2 to 10 inches. This work is done by the Keystone excavator, except where the cut has been the least, where hand labor has been used. An average day's run is 300 feet of road, 20 ft. wide between the car tracks, and with an average cut of 6 inches. This totals about 110 cu. yds. a day. The county pays for excavation to within 18 inches of the tracks, but by agreement with the railway company, which is improving the tracks and bringing them to the new grade, the contractor excavates from rail to rail.

Provision for railway traffic (all other traffic is detoured) and the projecting ends of the ties delay the grading work somewhat, but a 1½-yd. wagon is loaded in 2½ minutes. Owing to the shallow grading, the excavator is moved forward twice for every three wagons loaded. This and the usual delays cut into the speed so that not more than 10 or 12 wagons are loaded per hour. The contractor has been able to find suitable dumps near at hand so that long hauls have not been necessary. Three teams usually handle the output of the excavator. Two men, in addition to the engineer and fireman, are employed around the excavator. Nine men compose the fine grading gang and bring the subgrade to the proper section and elevation.

The old trap blocks are excellent for concrete aggregate when crushed. An Acme crusher has been set up at a central location and the blocks are hauled to this and crushed. This allows an extra economy, as the wagons hauling blocks to the crusher carry back crushed stone for the concrete base. Sand is shipped from Absecon for the concrete base and both sand and coarse aggregate will be shipped in for the asphalt. At present the sand is shoveled from the cars by hand.

A Koehring concrete mixer is used for laying the base, which is mixed 1:2:4, using Hercules cement. The average gang at the mixer is 18 men distributed as follows: 4 men on concrete; an engineer, a fireman, 3 men on sand, 6 men on stone, one man on forms, a foreman and a general utility man.

Work has not yet been started on the bituminous part of the contract and probably will not be begun for some time. A railroad mixing plant will probably be brought to the siding for furnishing the "hot stuff," which will be hauled to the job by teams. The base is to be 5½ inches thick, the binder course 1 inch and the wearing surface 1½ inches. The average mixture specified for the job is as follows:

	Bottom.		Top.	
	Min.	Max.	Min.	Max.
1¼—½	50	80	..	..
½—¼	0	10	..	..
¼—10	..	15	..	..
10—30	3	10	10	25
30—80	8	15	40	75
80—200	3	10	15	30
Over 200	2	6	13	20
Total stone retained on 10 mesh	70	80	0	0
Bitumen Content	4	8	10	12.5

The work is being done by Sutton & Corson of Ocean City, N. J., for Burlington County, under the direction of James Logan, county engineer. E. A. Fenton, superintendent for the contractors, is in charge of the work.

FINE GRADING GANG, FOLLOWING EXCAVATOR.

SEWER CONSTRUCTION IN CHICAGO*

Contractor's Methods Employed in Laying Six by Nine-Foot to Nine-Inch Sewers, a Considerable Part in Tunnel—Cost Details.

By H. R. ABBOTT†

To properly care for the sewage flow from the north portion of the Sanitary District of Chicago, intercepting sewers totaling 18 miles in length have been built or are now under construction. These sewers, which vary in size from 72 x 108-inch egg-shaped to 24-inch circular, collect the sewage from the many laterals and transport it into the North Shore channel, 8⅛ miles long, which in turn empties into the North branch of the Chicago river. The North Shore intercepting sewer was completed in 1916 and the Evanston sewer is now under construction.

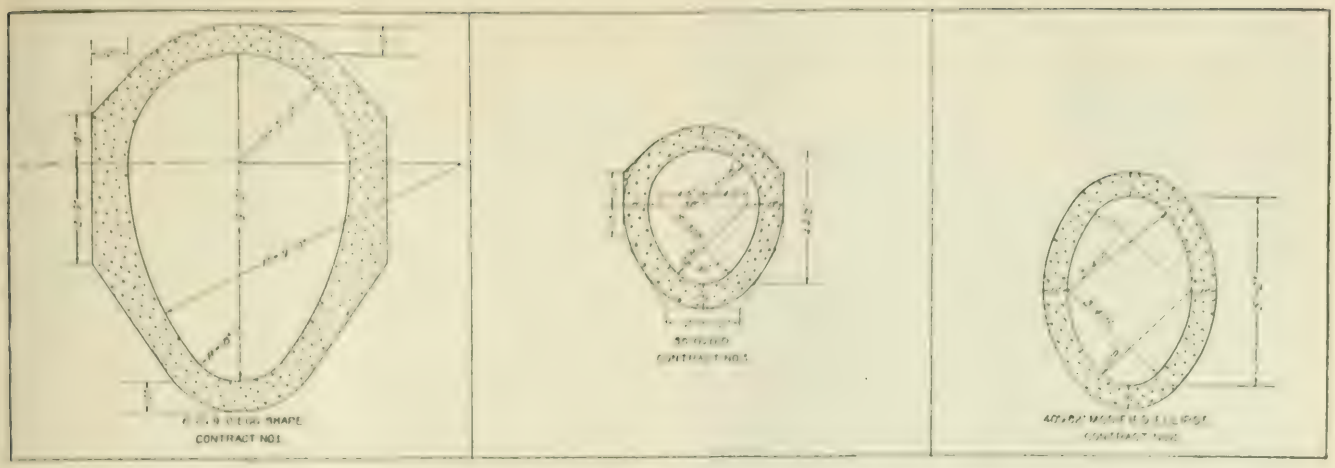
Preliminary work was done in 1913 on the North Shore sewer, transit surveys being run to cover the proposed route. Later, level lines were run and bench marks established. Borings were made at ¼-mile spacings along the route and the work divided into three contracts, 2.7, 1.3 and 4.7 miles in length respectively. On the first two contracts, alternate bids were taken on concrete, brick, and segmental concrete blocks, reinforced, the bids for brick running 10 per cent and those for segmental concrete blocks 20 per cent over the monolithic concrete.

Contract two, 1.3 miles in length, was mostly in tunnel. Contract No. 1 was built entirely in open cut averaging 21½ ft. in depth. The excavation was made by a Bucyrus 70-ton steam shovel, mounted on 16x16 timbers resting on house rollers across the trench and equipped with a 54-ft. dipper handle. In the maximum cut of 26 ft., some hand work was necessary on account of the great depth. The average daily progress for the entire working season was 70 ft., or 480 cu. yds. of excavation. The maximum daily run was 125 ft., or 850 cu. yds. All sheeting was left in place to protect local sewer and water pipes, though the entire cut was in stiff blue clay.

The section of sewer on this contract is monolithic concrete mixed 1:2½:5, and is 6x9 ft. in size, egg-shaped, changing to a 6x8-ft. section; the slopes are 1:2,000 and 1:2,500. Blaw steel forms of a collapsible

*Condensed from a paper before the Western Society of Engineers.

†Assistant Engineer, Sanitary District of Chicago.



TYPICAL SECTIONS OF NORTH SHORE SEWER, CHICAGO.

type were used, the sections being five feet in length. Both invert and arch forms were carried ahead by travelers, the arch traveler being 12 ft. long and carrying 15 ft. of form per trip. It ran on 9-inch wheels, supported on a small T rail placed on cross timbers about 3 ft. above the invert. The invert traveler carried one 5 ft. length of form on each trip. The invert form was suspended from a small boom, the rear end of the traveler being counterweighted to maintain stability. For this job 130 ft. of invert and 200 ft. of arch form were used. The invert form was supported at 5 ft. intervals by concrete blocks cast and cured outside the trench and placed to line and grade as soon as the bottom of the trench was shaped up, after which the space between the blocks was filled with concrete placed through a flexible jointed tube from a mixer placed to span the trench.

All material was teamed to the work, the average haul being 1¼ miles. Spoil was loaded direct from the shovel into 2½-yd. dump cars, which were hauled away in trains of seven cars each. An output of 0.8 ft. of complete sewer per man per day was obtained. This is very satisfactory progress for a sewer of this size and depth.

Contract No. 2, comprises a modified ellipse sewer, 40 x 62 inches in size, built partly in open cut and partly in tunnel. The slope is 1:1,250. On the open cut sections, a Parsons excavating machine was used, the excavated material being deposited along the trench. As the work was in unpaved streets, continuous sheeting was not used, and several cave-ins occurred. These were due chiefly to leakage from an existing tile sewer which paralleled the trench nearby.

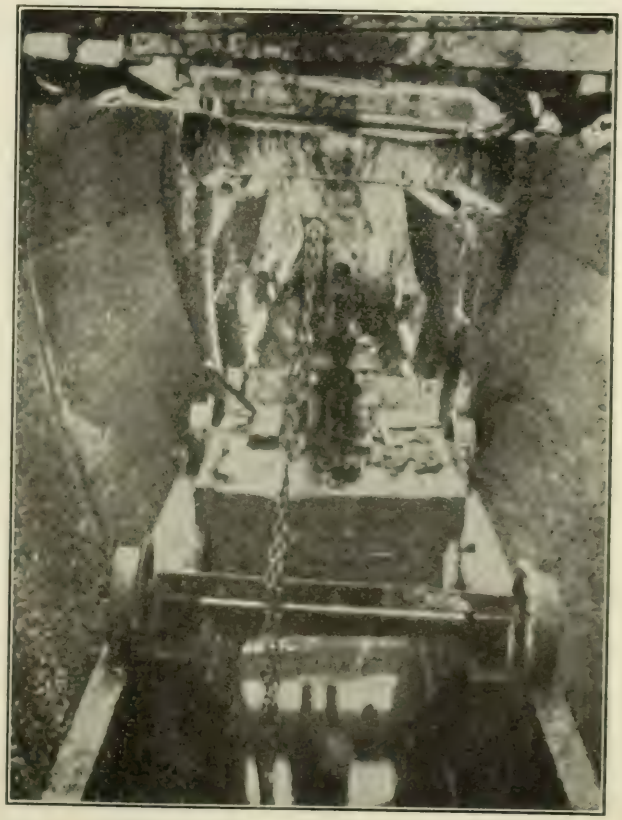
Blaw forms were used on this work also. The sections were 5 ft. long and five lenghts were bolted together as one unit when moving ahead. The invert was laid first, and the invert forms were then dragged ahead by block and tackle. The arch forms were equipped with 5-inch caster wheels and were carried on wooden stringers supported on cross beams. Collapsing was done by means of a turnbuckle, which also acted as a cross-brace. Fifty feet of invert and the same amount of arch forms were used on this job.

Concrete was mixed in a 10-ft. Whirlpool mixer, driven by a gasoline engine and chuted into the forms. Very little excavated material was hauled away and backfilling was done by teams. Progress on this section was very slow owing to the many construction difficulties. The output was only 0.66 ft. per man per day, a daily average of 25 ft.

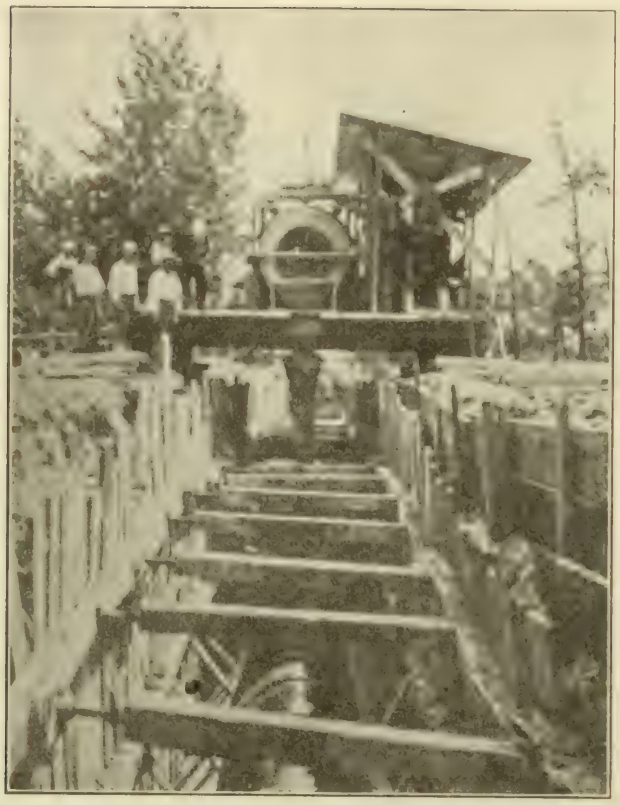
The westerly part of this contract for about 3,700 ft. was built in tunnel. Three shafts were sunk, rectangular and about 6 x 8 ft. in size. In sinking these shafts, the material was scaffolded up.

The headings varied from 600 to 900 ft. in length. Work in the headings was carried on by three shifts during the entire 24 hours. Very little timbering was necessary, owing to the nature of the ground, but some crutches and roofing boards were needed. A regular mining program was followed, two shifts in each heading doing the driving, making about 10 ft. each, and the third shift concreting this 20 ft. mined each day. Thus a total progress of 40 ft. in the two headings per 24 hours was attained. This is equivalent to 0.75 ft. per man per day and is good progress for tunnel work of this size.

Concrete for lining the tunnel was mixed by hand at the top of the shaft, loaded into muck cars and pushed by hand to the headings. A strongly timbered two-



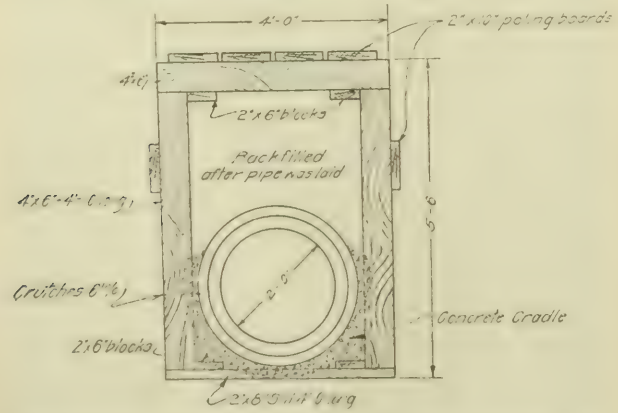
TRAVELER WITH BOOM FOR CARRYING INVERT FORMS AHEAD IN 5-FOOT SECTIONS.



CONCRETE MIXER ASTRIDE TRENCH, MAKING 6 FT. BY 9 IN. SEWER.

story head house carried the elevator, which was operated by a steam hoist. The muck was raised to the second landing and run out on a dump track for dumping on a muck pile or into wagons. At the completion of the tunnel work at one shaft, the head-house, hoist and boiler were moved to the next shaft. Ventilation for the tunnel was furnished by blowers blet-driven from a special engine. The Blaw forms for this tunnel section were the ordinary knock-down forms consisting of ribs and lagging plates, the plates being 5 ft. long and 18 or 21 inches in width. On this section, 80 lineal ft. of forms were used.

Contract No. 3 extended along the edge of the Skokie marsh through private property, about 3½ miles being built on easements from private owners. The contract included 36, 33 and 30-inch ovoid-shaped concrete and 24, 18, 12 and 9-inch tile sewers, beginning with a slope of 1 in 1,500 and increasing to a slope of 1 in 540. This contract was specified to be built in open cut, except for



TIMBERING METHOD ON 24-INCH PIPE SEWER IN TUNNEL.

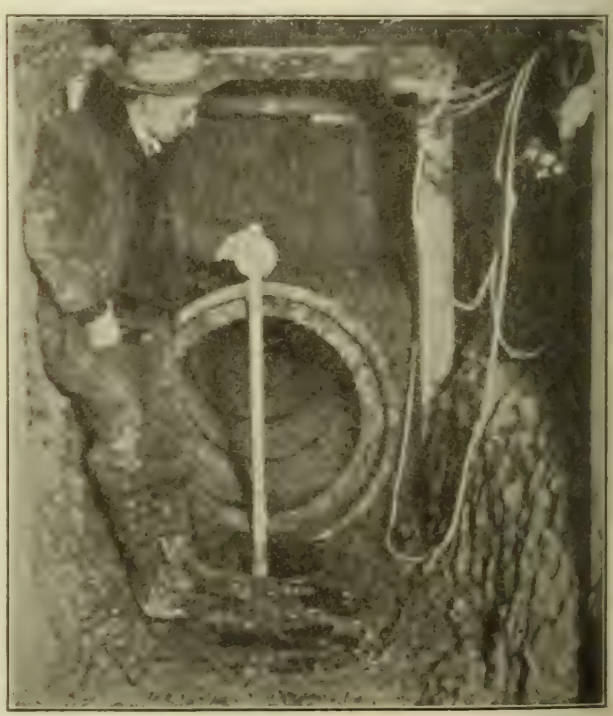
4,200 ft. of 24-inch tile. The contractor, after building the first 1,100 ft. in open cut and making unsatisfactory progress, decided to make all the balance in tunnel. The open cut work showed that the tunnel would be in fairly good clay; although the first six feet below the ground level was a very sandy loam and gave trouble in open cut, unless sheeting were used.

Shafts were sunk at short intervals for the entire bal- 92 shafts with 184 headings. The headings averaged 207 ft. in length on the 36, 33, 30 and 18-inch sections, but not on the 24-inch tile sections. The total length of the shafts was 1,943 ft., or about 10 per cent of the entire tunnel built from these shafts. An average day's progress on this work was 57 ft., including the shaft work, or nearly one foot per man per day, as against 25 ft. per day on the 1,100 ft. done by open cut.

Owing to the extremely small working space on these sections, it was impossible to concrete the sewer as the work progressed. The expedient was therefore adopted of mining continuously between shafts and concreting the whole length of the heading from the face back to the shaft after the mining had been completed

The shafts, averaging only 21 feet in depth, were circular, 6 ft. in diameter, lined with ordinary sewer rings and wooden lagging. They were sunk by two special crews, the first excavating and sheeting the shaft to a depth of 10 ft. and scaffolding out the material. The second gang completed the shaft and usually cut and timbered the eyes. Material was hoisted out with a carriage wheel winch, geared up to give more than usual speed.

Because of the frequent shifting, little plant was used. Two light, two-story timbered head-houses, built on skids, were used, one being in operation at the shaft where mining was under way, while the other was set up at the shaft ahead. The power plant was a single-drum hoist and a portable 30 h. p. boiler. The whole outfit was moved ahead, set up and put in operation in less than two hours



GIVING GRADE FOR 24-INCH VITRIFIED SEWER IN TUNNEL, CONTRACT NO. 3.

NORTH SHORE INTERCEPTING SEWER
COMPLETED JAN. 1ST 1916
GENERAL INFORMATION

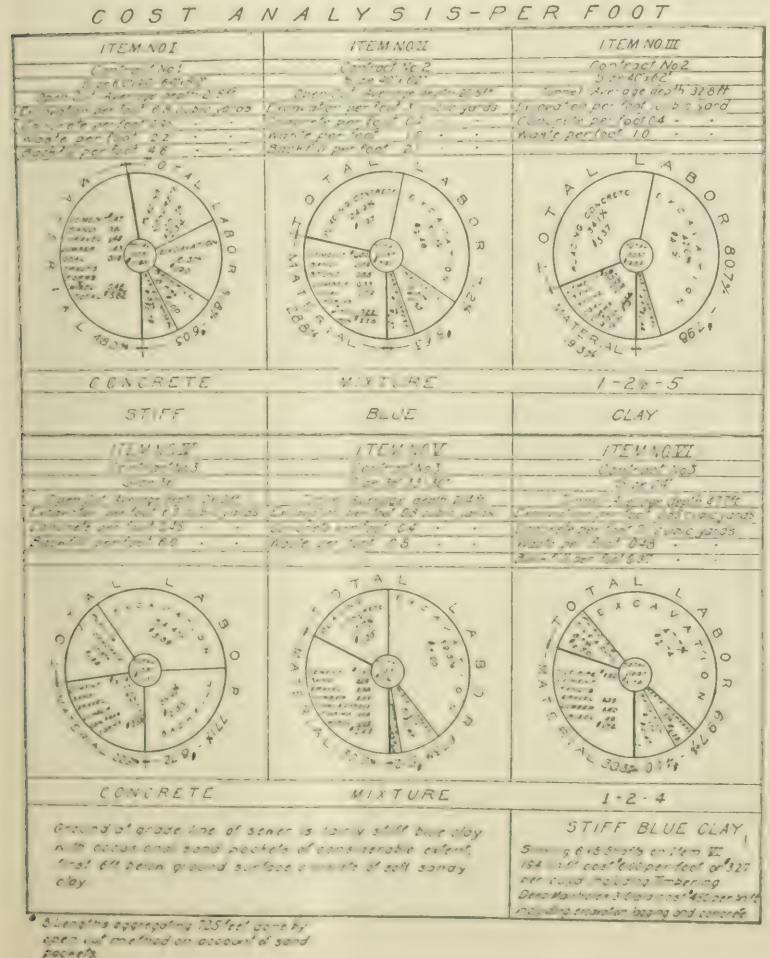
Item	Size	Shape	Average depth	Length	Actual time	Method used	Contract No.	Location	Contractor
I	8'0"x6'0"	Egg	31.5	1060.68	1500	Open Cut	1	Shermanville	Wisconsin Valley Improvement Co.
	8'0"x5'0"		21.5	439.0	1450	Open Cut	1	- -	
II	10'x6'6"		30.5	2940	8 mo.	Open Cut	2	Appleton & Kaukauna	Marquette Construction Co.
III	10'x6'2"		32.8	3835	1615	Tunnel	2	- -	
IV	36"	Circular	26.2	1112	1100	Open Cut	3	Brokaw Line	Nash Bros.
V	36"		25.6	24.91	1100		3	- -	
	33"		20.2	8272	915		3	- -	
	30"		20.5	6423	895		3	- -	
VI	24"		47.7	4195	1000		3	Wilson Ave	
	18"		23.5	2398	870		3	Grand Chute	
	12"		17.8	476	375		3	Streets	
	9"		20.0	123	380		3	In Cement	
				46340					

Note - All sewers over 24" in diameter built of reinforced concrete, 24" and under built of vitrified tile on concrete cradle.

Cost of Materials		
Kind	Items I - II - III	Items IV - V - VI
Cement	$1.19 per bbl	$1.25 per bbl
Sand	$1.65 per cu yd	$1.70 per cu yd
Gravel	$1.65 " "	$1.70 " "
Lumber	$22.00 per M.	$20.00 per M.
Coal	$3.50 per ton	$4.00 per ton
24" Tile Pipe		90¢ per ft

Cost of Brick Steel Forms per foot of sewer	
Contract No.	
1	Open cut - 20¢ per ft
2	Open cut - 18¢ per ft
2	Tunnel - 24 per ft
3	Tunnel - 18¢ per ft

COST ANALYSIS - PER FOOT


ITEM NO I
ITEM NO II
ITEM NO III
TOTAL LABOR 60%
TOTAL LABOR 72%
TOTAL LABOR 80%
CONCRETE MIXTURE 1-2½-5
STIFF BLUE CLAY
ITEM NO IV
ITEM NO V
ITEM NO VI
TOTAL LABOR 60%
TOTAL LABOR 72%
TOTAL LABOR 69%
CONCRETE MIXTURE 1-2-4
Ground at grade line of sewer is mainly stiff blue clay with occasional sand pockets of considerable extent. First 6ft below ground surface consists of soft sandy clay.
STIFF BLUE CLAY
Same as 6 & 8 ft cuts on Item V
154 lin ft cost complete per foot of $1.27
Per cent Labor 72
Timbering
Deep Manholes 3 each cost $450 per unit
including excavation, timbering and concrete

* 5 Lengths aggregating 725 feet done by open cut method on account of sand pockets.

Muck was brought from the heading to the shaft in tubs carried on small flat cars. No elevator was used, the tubs being hooked directly onto the hoisting cable, raised to the second landing of the head-house, and dumped into spoil wagons. Concrete was mixed in a Whirlpool mixer of ten cubic feet capacity and chuted down the shaft into dump cars which were pushed to the headings. Forms were removed by a special gang after the concrete and mining gangs had gone on to the next shaft. This gang also pointed up, plastered the invert and concreted up the opening at the shafts. The forms used in concreting the shaft had to be removed through the next shaft.

Sand pockets of considerable extent along a stretch of ¾ mile prevented the work being done in tunnel at these places with the means at hand. These sections were constructed by the open cut method, making the excavation by hand, the open cutting in eight such sections totaling 723 ft. This open cutting was very expensive for the contractor.

Built-up wooden forms were used on the 30 and 33-inch sections and Blaw steel forms on the 36-inch section, using 128 ft. of each kind. All material was delivered by team and for about one-half the contract it was necessary to lay plank roadways extending from the end of the nearest paved street to the work. This planking was taken up and used again and again. The average haul for material was 1½ miles.

The 24-inch pipe section was specified as tunnel in the contract. It was driven from four shafts averaging 49 ft. in depth, spaced about 1,000 feet apart, making the headings 500 feet long. All shafts were sunk at manhole sites and other manholes were built in specially excavated wells betwen the shafts. These shafts were similar to those described on contract No. 2. Excavated material was scaffolded out to a depth of 12 feet, after which a windlass mounted on a tripod hoisted out material in buckets. Excavation for the intermediate manholes was made in circular wells 4 feet 8 inches in diameter, sheeted with 2-inch lumber held in place by steel rings and the material hauled out by a windlass. No trouble was encountered in sinking these wells to a depth of 60 feet.

From the shafts, the mining was carried on continuously for the full length of the heading. the tunnel being timbered as the work advanced and track laid. Muck cars of half-yard capacity were used for transporting material. These were hoisted to the second landing of the head-house and the muck dumped into wagons.

As soon as the headings were completed, the pipe was laid in a concrete cradle, beginning at the far end of the heading and working toward the shaft. Pipes were brought in, one at a time, on the dump cars, the sides of which were removed. All joints were calked with jute soaked in cement grout, and plastered. The backfill was brought down the shaft in muck cars and packed over the pipes, the usual proceeding being to lay about four lengths of pipe and then backfill. The tunnel was about 4 or 4¼ x 4½.

A more permanent plant was used on this job. The head-house was a heavily timbered two-story structure, with a 6-ft. cage elevator. A dump track was laid out on a dumping trestle under which wagons could drive. No compressed air was used, but a small blower furnished air for ventilation. At the completion of work at one shaft, the boiler, hoist and head-

house, all mounted on skids, were moved by teams with block and tackle to the next shaft. Two days were required to move and reassemble the plant.

EXCLUDING GASOLINE FROM SEWERS.

An ordinance of the city of New York requires every garage where more than four motor vehicles are stored to install an oil separator or some similar device and that this be emptied and cleaned at frequent intervals; the object being to prevent gasoline from reaching the sewers, it having been determined with considerable certainty that such gasoline has been responsible for numerous explosions in sewers. Recently the Board of Aldermen of that city passed an ordinance repealing the ordinance requiring separators, but this was vetoed by the mayor and his veto was sustained a few days ago by a vote of 24 to 9.

In transmitting his veto, mayor Mitchell stated that he had asked the sewer bureau and the fire department to report upon the question, and that both had vigorously opposed the repeal of the ordinance. The chief engineer of sewers stated that for three years up to the present summer there has been much less difficulty than formerly and practically no explosions have occurred, principally owing to the precautions required by the ordinance. In June of this year, however, an explosion occurred in East 42nd Street, in which manhole covers were blown into the air. On July 23rd an explosion occurred in West 23rd Street, at the river front, in which 12 manhole covers were blown into the air and a number of people injured. The explosion was near the wooden sewer which served as the outlet under the dock, and this was found to be on fire, and had to be partially destroyed before the fire department could get control of the flames. The garage of the Adams Express Co. in 10th Ave. was suspected of being one of the chief sources of the gasoline that caused this explosion. In addition to these explosions, a number of workmen had been made ill by the gas fumes while in the sewers.

The mayor said in his veto that it is possible that oil separators can be dispensed with in outlying sections of the city, but that the safety of the sewer operators who are required to work daily in the sewers, as well as of the citizens in the streets, is endangered by gasoline in the heart of the city and is more important than the inconvenience and expense to garage owners of installing and maintaining the oil separators.

The ordinance requiring the separators has been declared constitutional by the Court of Appeals.

FEDERAL AID FOR PATENTED PAVEMENT.

In constructing the road from Little Rock to Camp Pike, the State Highway Commission of Arkansas selected Warrenite for the surface material. The cost of this road leading to the cantonment is estimated at $125,398. The State Highway Department a few days ago stated that the Secretary of Agriculture had approved of this selection and that he had set aside $52,398 in the U. S. Treasury with which to make partial payment of the cost.

The significance of the above lies in the fact that Warrenite is a patented pavement, and that there was considerable question a few months ago as to what stand the Secretary of Agriculture and the Office of Public Roads would take in connection with the use of patented materials and processes on roads, the construction of which was to be paid for partly from the federal aid fund. (See Municipal Journal for February 22, 1917.) This is said to be the first contract let under the federal aid act in the state of Kansas.

HANDLING AGGREGATE FOR CONCRETE ROADS.

Within the past few months Municipal Journal has described several concrete road construction jobs where special methods have been used to reduce the labor required in handling the aggregate. Another piece of construction work where special equipment has reduced the number of men necessary to handle and transport the sand and stone for the concrete is a section of about 11½ miles in St. Joseph County, Ind. This pavement is 18 feet wide, 6 inches thick at the sides and 9 inches at the center. The contractor for this work is Jacob Ackerman & Co., of Laporte.

Prior to the award of this contract this company had concentrated on brick and macadam paving and consequently were without the special equipment necessary to handle economically a large concrete road contract. The total cost of the road was about $175,000. To handle a job of this size required the purchase of a large amount of machinery, and a paving mixer, forms, 3 miles of Koppel industrial railway, a locomotive and 45 standard 1½-yard cars and the special equipment necessary for this type of work were bought.

Instead of following the standard practice in regard to loading the aggregate into the cars, hauling it to the road and dumping it there to be fed to the mixer by wheelbarrows, the contractors devised a method whereby it was possible to mix concrete without moving the material by hand. Gravel and sand were delivered by railroad to bins erected along the track, the aggregate being discharged by gravity from the cars into a chute, whence it was raised by an elevator and discharged into the bins.

From the bins, which hold about 35 yards each, the sand and gravel were loaded by gravity into the Koppel cars, 15 cubic feet of gravel and 9 cubic feet of sand—enough for one batch of concrete—being loaded into each car. On top of this sand and gravel was deposited six bags of cement. Fifteen cars, loaded in this way, made up a train. This train was hauled to the mixer, which was equipped with a skip working at right angles to the drum and long enough for the industrial side-dump cars to discharge directly into it. The mixer is a special machine built by the Marsh-Capron Manufacturing Co. It has a capacity of 36 cubic feet and, as stated above, has a specially designed skip. The concrete is mixed 1 : 1½ : 2½.

By handling the concrete material in this manner, a much smaller number of men is required to operate the mixer than would be the case if wheelbarrows were used to convey the sand and gravel to the mixer. No material is lost by scattering on the sub-grade, and there is no danger of getting earth mixed with the sand or stone. No cement pile is required with the attendant danger of waste by wetting, etc.

For grading, a Thew steam shovel with a ⅝-yard dipper was used, especially on the heavier cuts. Teams were used for hauling, 35 being employed at times.

Driven wells furnish the water for mixing the concrete and curing the completed roads. Water is pumped by a 6-h. p. kerosene-driven engine through a 2-inch pipe line. The pipe line is provided with tees 150 feet apart for hose connections. The capacity of the water works system is about 18,000 gallons a day, and a pressure of 30 pounds is maintained, a pressure tank insuring a steady supply.

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Subscribers are requested to notify us of changes of address, giving both old and new addresses.

Contributed Articles and Reports.

Contributions suitable for this paper, either in the form of special articles or as letters discussing municipal matters, are invited and paid for.

City officials and civic organizations are particularly requested to send Municipal Journal regularly their annual and special reports.

Information Bureau.

Municipal Journal's Information Bureau, developed by twenty-one years' research and practical experience in its special field, is at the command of our subscribers at all times and without charge.

PLACING HOUSE CONNECTIONS AHEAD OF PAVING.

There are a number of arguments both for and against the practice (which a number of cities have adopted), before constructing a new pavement on any street, of laying house connections for every lot on such street from sewers, water and gas mains. The object is to prevent the necessity of afterward cutting openings in the proposed pavement for laying such connections, which cutting is both expensive and liable to cause a serious injury to the pavement. Against the practice it is argued that the capital represented by such services renders no return in the form of either interest or service—that many of such service pipes, in fact, will never be used; that water and gas services are apt to leak from corrosion or other cause and such leaks continue undiscovered for years; and that sewer connections admit ground water into the sewer through uncovered ends or leaky joints.

Most of these objectionable features can be eliminated by ordinary care in construction. But inspection of a recently constructed work of this kind has again impressed upon us the greater or less prevalence of carelessness in such work in other respects. The chief of these is in backfilling. The instance in question consisted of laying house connections along a mile of street which it is proposed to pave next year. No care whatever was taken in refilling the trenches, but the dirt was cast back loosely and a hight mound now marks the site of each trench. As the soil is a clay, there is little possibility that the backfilling will settle compactly before next spring. (We have known trenches in such soil to continue settling for ten years and more). Settling of the trench after the pavement has been laid is apt to defeat the very purpose of the construction, by necessitating the taking up and relaying of the pavement over such trenches when it shall have settled from lack of support.

Money spent to prevent the necessity of cutting into a pavement for laying connections is worse than wasted if the cuttings must be made for another purpose; and in most cases such worse-than-waste can be avoided only by properly compacting the backfilling. This may make the cost a little greater, but if such increase is necessary to give any value at all to the principal expenditure, there can be no question of its desirability.

Another point is the future finding of these connections. They are usually terminated at the curb, and when they are put into use must be continued from the curb to the building. In order that the curb end of the connection may be found years hence, such end should be located by careful reference measurements to some permanent point. Not only this, but it is very desirable to indicate the exact location by means of a durable monument of some kind; for mistakes may occasionally be made in the reference measurements, or the plumber or other who is endeavoring to locate the service may use an inaccurate tape. It is an excellent practice to bury an iron or copper rod in the ground, directly over the end of the pipe and with its upper end about at the ground surface. It will then be necessary only to scratch the surface with a hoe or shovel before digging to learn whether the surface has been correctly located by the measurement.

HIGH-COST PAVEMENTS FOR COUNTRY HIGHWAYS

Thirty or forty years ago nothing more durable or expensive than macadam was considered necessary for any streets except the main thoroughfares of the large cities. But with increasing traffic the realization was forced upon city and even village authorities that macadam should be extended to practically all the streets of a municipality, and some more durable material used upon the heavier-traffic streets. A few years later the use of macadam on main country highways was recognized as necessary and the more durable pavements were employed on increasing numbers of city streets.

The increase in number, weight, speed and mileage of vehicles increases, and the traffic burden on the main country roads is rapidly reaching the intensity found on city streets a few years ago. It is therefore only logical that more durable pavements should be adopted for such roads. It is not the location of a roadway, whether it is bordered with sidewalks, or what kind of governmental body has charge of it that should determine the kind of construction to be employed, but the service that the roadway is to perform. And that service is determined by the kind and amount of traffic to be carried.

It is therefore proper that many roads outside of city limits and not bordered by houses should be paved with sheet asphalt (as described in this issue), brick, stone block, or whatever other pavement may be most suitable to the traffic and ultimately most economical, set upon a concrete base and constructed in every way as carefully as if on a city street. What pavement is most suitable and economical is determinable by the same considerations and calculations as in the case of city streets.

We would not wish to imply that all country roads should be given the most durable type of pavement. To do so would be out of the question financially, even in these days of five billion dollar bond loans; and it would be criminal waste of money, since in the case of the majority of roads a much smaller expenditure would give

a service to the light traffic they carry almost if not wholly as satisfactory as would the most expensive pavements.

But some country highways demand the highest type of pavement. The diversity of conditions as to traffic is greater on country highways than on city streets, and the mileage of such highways is enormously greater, and more care and expert judgment are needed, therefore, to decide just what routes should receive the most durable pavements and on what ones only a cheaper or even the cheapest construction is warranted. Such decision should be made by the best traffic paving experts obtainable; and since towns and small political units can hardly employ such, and since the selection of main routes is one that outreaches the boundaries of any one or two towns, such decision should be entrusted to state and national boards, which should refer it to the best talent that they can secure.

IMPROVING THE CURVES OF OHIO ROADS.

In reconstructing the main roads of Ohio, considerable attention has been paid by the engineers of the State Highway Department to improving the conditions on the curves. In the old days before automobiles were common, there was no need of building a road on a curve any differently from a straight road. With the present large number of automobiles a different construction is necessary. In the first place, the high speed of the automobile makes it very desirable to have the curves wider than the straight sections of the road. Some engineers have advocated widening the outside of the curve, but the Ohio engineers believe that the extra width should be added on the inside. A car moving on the inside of a curve naturally is driven along the side of the road. A car moving on the outside of the curve, on the other hand, is naturally driven near the center of the road, and if the road is widened on the outside of the curve the driver is forced against his natural inclination to turn out to the outer side, curving his car out somewhat when he enters the curve and bringing it back toward the center when he leaves it, assuming that he is careful enough to take this precaution for the sake of safety. By widening the curve on the inside, there is none of this necessity of departing from the natural inclination in driving.

Aother feature of the improvement, which also is being carried out in most states, is to bank the road on the curves in such a way that the cross-section of the road slopes contiuously upward from the inside to the outside instead of being crowned in the center. Observation of the use of the roads in Ohio has convinced the engineers that a slope of ½ inch to the foot from the outer to the inner edge of the roadway is about the limit which it is easy for horses to travel on, and this slope has accordingly been adopted as the maximum which the cross-section of the road should have on curves. A car can run on a curve having a radius of 1,400 feet, when the cross-section is sloped in this way, at a speed of 30 miles an hour without causing the occupants any inconvenience. If the curve has a shorter radius, say 650 feet, the speed of the car must be reduced to about 20 miles an hour in order not to inconvenience the passengers, and if the radius is 300 feet the speed should be reduced to about 14 miles an hour in order to prevent the passengers being thrown toward the outside of the curve. A highway cannot have the curves banked sharply when the radius of curvature is small, as can be done on railways, because the sharp inclination in such a case would be altogether too great for the road to be passable with safety by horse-drawn vehicles. The best that can be done is to bank the curves on a moderate slope and trust that drivers will have enough regard for their passengers to slow down when they are on sharp curves.

MAINTAINING MACADAM ROADS IN RICHMOND

How a Small City Maintains Macadam Streets by Surface Treatment With Oil and Keeping Up Small Repairs.

Richmond, Ind., is a small city, located in a limestone county, and has a large mileage of macadam streets, most of them built with broken stone but some of them with excellent gravel, which also is available. The street department long ago formed the habit of looking after the streets closely, and the city has been notable for the regular surfaces of these streets and the small proportion of rough and broken roadways.

Recently city engineer Fred Charles has put in practice a method of maintaining these streets which is greatly improving them and relieves the street department or the property owners of the heavy expense of street sprinkling to keep down the dust of the old macadam streets.

When an old gravel or broken stone street needs general repairs, the surface is scarified and brought to a uniform grade, crown and surface. It is then covered with 3 to 5 inches of broken stone of the usual size for surface layer, about 1 to 2½ inches, and rolled into place, generally using stone dust as filler. This makes a good macadam surface, but it soon becomes dusty, whether it is thoroughly filled with stone dust or no stone dust is used.

The construction is made by day labor under the street commissioner, and exact accounts of the cost of each street are not kept. Careful estimates show that the cost varies from 35 to 50 cents a square yard, depending on the amount of work done, but largely on the length of haul of the stone.

Some months after the street is constructed, usually the first or second year following, it is treated with 40 per cent asphaltic oil, such as Standard Oil Company's No. 4. The amount of oil used varies according to condition of street and of the street repair funds. The best results are obtained by applying first one-third gallon of oil per square yard and following with a second treatment, using one-sixth gallon. Each coat of oil is covered with a coat of stone screenings from which the dust has been removed. The oiling cost is assessed on the property at about 10 cents a linear foot, which amounts to about 4 cents a square yard.

Many streets receive but one coat of oil, which seems to produce good results under proper conditions.

Concrete curb and gutter is in quite general use, and the streets are quite uniform in width, or at least in width of surface receiving treatment.

Streets which receive a treatment of the oil of about one-third gallon a square yard a year assume the general appearance of asphalt streets and show few broken or raveled spots. Where traffic is heavier than the average, the streets should have a treatment each year without reference to the uniformity in the good condition of the street, but the condition of the street repair fund does not always permit this, so that frequently a street is passed for a year. As a consequence, there is no street with an absolutely perfect surface throughout. The line of economy between perfection of appearance on the one side and too great deterioration and consequent high

cost of special repairs is quite closely drawn by the city's practice. A few notes of individual streets will illustrate this point.

Fourteenth street from Main to South A is a block of macadam built in 1907. It was first oiled in 1913 and has had four annual treatments, not receiving one in 1917. The surface has the general appearance of a sheet asphalt street and has no broken or raveled spots, except where the surface has been disturbed by cuts which were not properly refilled.

Thirteenth street was resurfaced with macadam in 1915, according to the method described above. It has received two coats, of one-third gallon each, of oil, one in 1916 and one in 1917. The surface is in good shape and has a uniform crown.

North Eleventh street was resurfaced with macadam in November, 1916. In the spring of 1917 it received two treatments, of one-third and one-sixth gallon, respectively. Some areas show slight raveling, especially on the steeper grades, and some holes are developing, so that another treatment will be required early next year, with some special filling of holes such as described below.

The block of Sixteenth street from A to B was resurfaced in 1916 with macadam in which no stone dust was used as filler. At the same time the street was oiled, and the oil was covered with sand instead of stone chips. While this street has a fair appearance, it is not wholly a success, owing doubtless to the use of light oil for the large voids in the stone, without filler

The next block of this street was of the city's standard reconstruction, with macadam in 1915, oiled in 1916 but not in 1917. It is a good street for light traffic but shows the advisability of annual treatment, though not yet showing too great deterioration for economical treatment.

One long block of this street shows the effect of a number of defects in treatment. Part of the street is completely covered with the asphaltic surface, and part is much spotted. Some of this spotting is attributed to using the street too soon after oiling. One difficulty in the practical treatment of a street is to prevent too free flow of oil to the gutters, which it tends to do, partly because of the pronounced sideslopes which are necessary in crowning the streets to insure good drainage and that no water stands in spots on the surface. The attempt to keep oil out of the gutters on this street was overdone, and the treatment did not reach them; and horses standing along the gutter have disturbed the untreated surfaces occasionally. If the voids in the stone are not well filled with stone dust, the standard treatment is too thin, and it soon disappears. This street was oiled in halves, and the result is not as satisfactory as though the whole width of the street had been oiled at the same time. Variations in treatment do not seem to be so great when the whole street is treated at once as when it is treated up one side and down the other.

On account of the method of securing the reconstruction of streets and assessing the cost of oiling, much of the treatment is done in separate blocks at different times. This makes the cost slightly greater, and the variation in the appearance of adjoining blocks down a street is quite marked. Continuous work would be more satisfactory.

Numerous lightly traveled blocks of streets in the city are on rather steep grades, and the crowns are kept rather high, so that the water from the street surface runs down the concrete or brick gutter. These streets are macadamized and retain their surfaces satisfactorily, except along the gutters, where any water beyond the gutter capacity washes out the dust filler and leaves the stone in a raveled condition. The use of oil on such streets keeps them in good condition, if the street can be filled quite to the gutter. A treatment of oil for a foot or two adjacent to the gutter may be all that is necessary to overcome this special condition.

Along the margins of hard pavements, where the crown may be flattened out, the oiled macadam wears much more rapidly than the rest of the street, and these narrow strips are repaired by mixing heated Tarvia X with the fine broken stone and tamping it in place. The same process is used in filling holes which have worn through the thickness of the macadam.

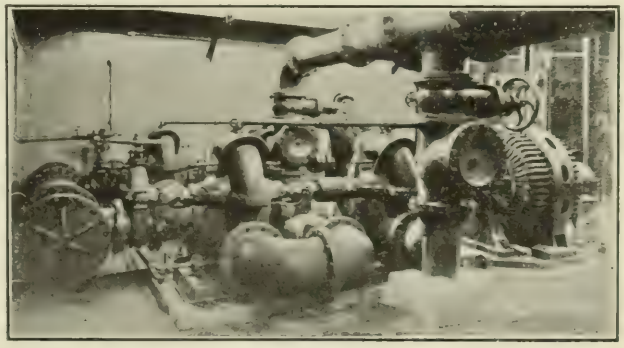
One interesting experience is that a softer Richville limestone, while it wears more rapidly, cements better and makes a street which wears more uniformly than the harder New Paris stone. This was shown clearly on one street where one kind of stone was laid on one side of the street car track and the other kind on the opposite side. Uniformity of wear makes the street made of the softer stone last as long as or longer than one in which the harder stone was used, the latter wearing into holes more quickly and requiring repair sooner.

CAMDEN'S ELECTRICALLY OPERATED PUMPS.

There has recently been put into service at Camden, N. J., a pumping installation consisting of two centrifugal pumps operated by electric current obtained from the Public Service Electric Company. It is located at the Del Air plant of the Camden water works, where the pumps are placed about 12 feet below the ground level in a pump well covered with a neat brick building.

The pumps are both 12-inch centrifugal, double-suction, single-stage with a combined capacity of 10,000,000 gallons per 24 hours against a pressure head of 150 feet. Each is connected through a horizontal shaft to a 200 h.p. synchronous motor, using current at 2,200 volts, at which voltage it is received from the power company. For lighting and for two 10 h.p. induction motors that operate rotary vacuum pumps this voltage is cut down to 220 by transformers.

The switchboard has three panels, one for each main pump motor with the necessary relays and switches, and an ammeter and reactive factor meter, and a metering panel carrying the central station's kilowatt-hour meter and curve-drawing wattmeter. A switch near each of the smaller pumps controls it.



CAMDEN PUMPING PLANT.

During a test run the pumps, with suction heads of 27.33 and 26.5 ft. respectively and operating against a pressure head of 150 ft. developed an over-all efficiency of a little under 72 per cent, or a current consumption of about 160 kw. The figure would have been somewhat better if the water had not contained some air.

The plant was furnished by the Camden Iron Works, all the electric equipment being manufactured by the Westinghouse Electric & Manufacturing Co.

The WEEK'S NEWS

State Highway Developments in Missouri, North Carolina and California—Infantile Paralysis in Chicago—Passaic Valley Sewer Costs Go Up—"Health Week" in Minneapolis—Buffalo's Hospitals Reorganized—More Wanaque Litigation—New York Aldermen Against Meters—Park Lighting in American Cities—Fort Worth's Police Chief Shot—Abolish Four Cent Fares in Seattle—Cleveland's Rapid Transit.

ROADS AND PAVEMENTS

Convicts for Missouri Roads.

Jefferson City, Mo.—Missouri's war programme includes the employment of five hundred convicts on road work and it is likely that the first road to be built will be the Columbia-Jefferson City highway to link the seat of the state university with the state capital. Plans for the construction of a permanent highway over this route have been considered for several years, but prison labor did not become available until this year with the abolition of the prison contracts. Since the beginning of the war, William R. Painter, chairman of the Missouri prison board, has been urging harder than ever the proper utilization of the labor of the 2,600 prisoners confined in the state institutions. The price to be paid for each convict used by the state highway department was not fixed until Governor Gardner suggested the compromise price of $1.25, for which the state will feed, clothe, transport and guard the prisoners.

No State Road Aid in North Carolina.

Raleigh, N. C.—"State aid for highway building in North Carolina is in name only," according to a recent statement by Col. Bennehan Cameron, of Staggville, chairman pro tem of the state highway commission. Colonel Cameron declared the failure of the legislature to report the $75,000 asked for to pay the cost of highway engineering in the state, in time for debate and passage in the last general assembly had placed the burden of support of the big work on the individual counties. W. S. Fallis, the state highway engineer, has also pointed out that the placing of the financial responsibility upon the counties is undesirable. The state of North Carolina can get a maximum of $1,700,000 from the federal government for road building on condition that the state put up a similar amount. This would mean the expenditure in the next four years of $3,400,000 on road building in the state under this special provision, but when the state government failed to take any part in furnishing the money for its half, the counties had to get what amount they could by raising the 50 per cent of the total severally.

Planning $9,000,000 California State Roads.

Sacramento, Cal.—Following an agreement on the general proposition of building the seven new state highways and laterals as provided by the legislature in its appropriation of $3,000,000 for the state's share, the state highway commission is outlining a working plan for proceeding with the improvements, which aggregate $8,963,675. The various county supervisors will be heard and will be assisted by the highway commission in devising means for bearing their share of the expense, which has been apportioned by Austin B. Fletcher, chief engineer. The estimates made for the laterals, mileage and proportion of cost for both the state's and the county's share of construction under the present cost of material, labor, etc., are as follows: Trinity lateral—Length, 102 miles; estimated cost, $1,175,000; state's portion, $393,240; county's portion, $781,760. Pacheco lateral—Length, 83.45 miles; cost, $1,618,413; state, $541,650; county, $1,076,764; Mariposa lateral—Length, 32.60 miles; cost, $533,554; state, $178,560; county, $354,997. Coalinga lateral—Length, 98.25 miles; cost, $1,502,538; state, $502,867; county, $999,678. Cholame lateral—Length, 91.22 miles; cost, $1,339,596; state, $448,320; county, $891,275. San Bernardino-Barstow lateral—Length, 76.33 miles; cost, $534,112; state, $178,770; county, $355,340. San Bernardino-Yuma lateral—Length, 195.86 miles; cost, $2,260,462; state, $756,510; county, $1,503,949. The greatest expense falls upon the counties through which the new roads will pass. This is due to the increased cost of construction as compared with the estimates upon which the Legislature based its $3,000,000 appropriation. It was figured that with the counties making up $3,000,000 the roads could be built. It is now necessary for a redistribution of the expenses, and instead of expending $6,000,000, as originally estimated, the cost will be $8,963,675, leaving a difference of $2,963,675 to be raised above the original sum. Whether the state and the federal government will assume a part of this increase will be determined later. Plans had been originally made for eight highways but high costs have necessitated cutting down the program.

SEWERAGE AND SANITATION

Believe Poliomyelitis Epidemic Checked.

Chicago, Ill.—The rate of increase of infantile paralysis in Chicago is now so slow that the health department is led to believe the disease will soon be completely checked. Cooler weather of the past few weeks is given as the chief ally. By Oct. 1 the total number of cases in the city was 170. Altogether seventy cases were reported for the last week of the month as against sixty-six for the preceding week. An educational drive was launched when 12,000 pupils of high schools and advanced grades in grammar schools were called to attend a series of public health meetings. They were told of the causes of the disease and preventives. Each pupil represented some unit of Chicago's 300,000 school children. It is believed to be the first time such a series of meetings was held. It is planned to hold regular meetings hereafter with stereopticon views, moving pictures, and posters. Health commissioner Robertson pointed to the seventeenth ward situation as an example of the effectiveness of the department's precautionary measures. On the commissioner's recommendations this ward was given a thorough cleaning by the street department. There was not a new case of the disease reported in several days while a few weeks ago it had more cases than any other part of the city.

War Adds $2,000,000 to Passaic Sewer Cost.

Newark, N. J.—War prices have added approximately $2,000,000 to the estimated cost of the Passaic Valley sewer. Chief engineer William M. Brown has reported to the sewer board that a new estimate based on present conditions indicates that $15,500,000 may be required to complete the work. Following the presentation of this report, the board authorized preparation of supplemental contracts, based on these figures, for submission to the fifteen municipalities in the original contract. Contributions which will be made to the cost of the sewer if the municipalities which have applied are actually admitted will total approximately $2,426,339. Chief engineer Brown's report said in part: "Prior to November, 1916, an estimate was made of the cost of completing the sewerage work. The estimate showed the total cost to be $13,500,000 under conditions then prevailing. Since that date the cost of all construction material and labor has advanced rapidly,

due to changed economic and war conditions. The lowest bid received in June, 1917, for the construction of Section 2 of the outfall tunnel was $750,000 above the fair cost at the time the estimate was made. At this date there is little to indicate that prices will not remain at a high level for a long time to come. An estimate at this date indicates that the cost of the sewerage work may total $15,500,000. It seems to me to be imperative to complete the sewer at as early a date as possible, both because of conditions which exist in the Passaic Valley, due to pollution of the river, and because of the large amount of money already invested by the municipalities in this enterprise." The six municipalities expected soon to join those in the original contract, and their contributions are as follows: East Orange, $1,189,319.14; Orange, $555,480.19; Bloomfield, $234,193.64; Glen Ridge, $125,623.39; Haledon, $34,037.72, and Prospect Park, $18,037.43, a total of $2,156,691.52. In addition to this amount, interest payments will total $269,644.77, making a total contribution of $2,426,336.29 by the six municipalities, if they are admitted. It is hoped to have the sewer in operation by December 31, 1918.

Epidemics Cause Closing of Public Places.

Murphysboro, Ill.—The city commissioners ordered all schools, picture shows, churches, and other meeting places closed following the discovery of fifteen cases of smallpox, four cases of diphtheria, and one of scarlet fever in the city.

Police Power to Compel Connection with Sewer.

Atlantic City, N. J.—Holding that is not an unreasonable exercise of police power by a city to require an abutting land owner to connect his building with a public sewer, notwithstanding he may already have a private sewer, the supreme court at Trenton has affirmed the conviction of Charles Fenton of this city for failure to obey its requirements in this respect. Fenton's property has a private pipe line, which empties into the Thoroughfare. Fenton contended that the city had failed to charge him with a nuisance, but the supreme court holds that it is not necessary to wait until a nuisance exists and to put public health in jeopardy in the meantime. "A board of health would meet with merited condemnation if it stood by and took no steps to produce by the exercise of ordinary prudence a sanitary condition which would prevent an epidemic of disease likely to grow out of known conditions," says the opinion.

Typhoid Epidemic Traced to Water Supply.

South Bend, Ind.—The city's epidemic of typhoid fever, which for some time threatened to pass beyond the control of local health authorities and which has resulted in the deaths of seven persons, originated from a polluted municipal water supply, according to a statement made by major J. O. Cobb, United States army surgeon, who conducted an investigation. Major Cobb and lieut. C. D. Akin arrived in South Bend as soon as the epidemic assumed alarming proportions. Attention was immediately given to the water supply inasmuch as all trains passing through the city take on supplies here. In view of the situation it will be necessary to prohibit the use of city water on trains for interstate passengers. In submitting his report to mayor F. W. Keller, the board of public health, and the city water department, major Cobb outlined five corrective measures that should be adopted by the city in order to maintain a high standard of water. These are "Immediate installation of chlorine treatment apparatus. Discontinuance of the central reservoir pending reconstruction. Elimination of the wells in the river at the central pumping station by filling with concrete, as was practiced by the superintendent of the city water supply in connection with the recent closing of the eight wells at the north pumping station. Rearrangement of the supply systems at both stations, so that water from the wells will store in the reservoirs by natural flow. Removal of the potential danger of suction in the present 24 inch and 16 inch mains crossing the race by substituting direct pumping into these mains." The report continues: "In reviewing the present typhoid epidemic, there are important factors, other than water, for the public of South Bend to consider. Right in the center of the city there are many dangerous privy vaults. Typhoid fever can never be stamped out entirely so long as this condition is continued. Typhoid fever has existed in this city for a number of years and in all seasons. During this time human carriers of the disease may have originated. In fact, it would be astonishing if this were not the case. That the present outbreak is from a common source of infection uniformly spread over the city, involving all classes of society, is obvious on examination of all the data at hand. That this common source of infection is wholly from the water supply is debatable ground. However, I have come to the conclusion that the majority of the present cases originated from that source." Plans for reconstructing the water system have been made by water superintendent John W. Toyne and chlorine apparatus ordered. The reservoirs have been drained. The school children are being vaccinated against typhoid when requested by their parents. Dr. Charles Bosenbury, secretary of the board of public health, said that while the people were warned on Aug. 26 to boil all water, there still seems to be a general apathy towards the use of boiled water. As a consequence there are numerous cases breaking out all over the city. There were 132 cases reported in September. The supply of drinking water has been turned off in the city hall and all other public buildings since the report of the federal authorities.

"Movies" Help in Health Week.

Minneapolis, Minn.—The city is celebrating "Health Week" this week. All agencies of publicity have been enlisted to impress the message of public health in the minds of the people. Health films and health slides will be shown in Minneapolis motion picture theaters during the whole week, Oct. 6 to 12. Some of the reel titles are, "The Error of Omission," "The Great Truth," "From Field to Cradle," and a slapstick comedy, "Swat the Fly." The feature film will be "The Street Beautiful." Health films and slides will be shown in 35 motion picture theaters, downtown and in the neighborhood sections. Similar cooperation has been obtained from the churches, and Oct. 7 was proclaimed "Health Sunday." Local pulpits were filled by visiting physicians, social workers and Red Cross nurses who gave messages of health. The opening event was the health parade at 2 p. m., Oct. 6. The Mississippi Valley conference on tuberculosis met in the city on Oct. 8 and 9 and was attended by almost 1,000 physicians, hospital superintendents, social welfare workers and nurses. The schools were also visited by speakers. Mrs. C. A. Donaldson, of the Woman's auxiliary of the Hennepin County Medical society and a group of women workers recruited automobiles to transport the speakers. There were also neighborhood meetings in all sections of the city. Dr. P. R. Thomas, of the oral hygiene committee of the Minneapolis District Dental society had 50 minute men who visited schools, shops and factories and spread the gospel of care of the teeth as a means of staving off disease. A mass meeting was held Oct. 9 at the auditorium at which Dr. Marion LeRoy Burton, president of the University of Minnesota, presided.

Reorganizing Buffalo's City Hospital System.

Buffalo, N. Y.—The council recently passed ordinances transferring the jurisdiction of the bureau of hospitals and dispensaries from the commissioner of health to the Board of Managers of the City Hospital. This important step was not taken hastily. Almost from the very beginning of his administration, nearly eight years ago, health commissioner Fronczak and other interested officials had the plan of consolidation in mind. February 20, 1909, the then board of health issued a proclamation, declaring the city of Buffalo in the grip of a scarlet fever epidemic. This was a necessary legal step in order that money might be appropriated immediately for the purpose of combating the scourge. An old abandoned school house was converted into a temporary scarlet fever hospital. It was hoped at the time that the need for its use would be short lived. Several attempts were made to close the

institution, but each time the problem presented itself as to what would be done with the patients on hand. In spite of the improved service afforded by the temporary institution new patients kept taking the place of the old ones. Finally, in response to an insistent demand on the part of the local physicians, the wooden building next to the brick schoolhouse, which was used as an annex, was opened for the treatment of diphtheria cases. The board of aldermen appropriated funds to defray the expense of having the institution put in presentable shape for a more or less permanent occupancy. The campaign of improvement was inaugurated, which is still unfinished in spite of the fact that the Department of Hospitals and Dispensaries now has available 670 beds and a staff of 140 employees. After long agitation a large plot of ground, consisting of 83 acres, was purchased by the city, and the comprehensive plan of city hospital construction started under way. On or about November 1, 1917, the new Buffalo city hospital, since erected on this site, will be ready for occupancy. Just as soon as the psychopathic and tuberculosis departments of this hospital are settled in good working order steps will be taken to insure the erection of additional buildings on this property so that the remaining departments of the municipal hospital and the Ernest Wende hospital may be housed in this same institution. Coincident with the growth of the various hospitals of the department of health came the development of the five health centers covering the entire city, each in charge of a city physician working on full time at an adequate salary. The new change in management is the culmination of years of constant study and work on the part of the department of health, with the idea of completing a hospital system which would meet all present needs and adequately provide for the future. While the hospitals and dispensaries as now managed are apparently divorced from the department of health really such is not the case. Health commissioner Fronczak is chairman of the general advisory board of the Department of Hospitals and Dispensaries, and also a member of its advisory board on health centers. The work of the Department of Hospitals and Dispensaries will proceed along the same lines as heretofore. Credit for the development of the hospital sysem is particularly given to mayor Fuhrman, health commissioner Fronczak and Dr. Walter S. Goodale, who was first tenement house inspector and later at the head of the original hospital, and has now been appointed superintendent of hospitals and dispensaries.

WATER SUPPLY

Water System Nears Completion.

Aberdeen, Wash.—Within three months the new water system of Aberdeen, which has cost over $400,000, will be finished. The dam which is being built above the falls of the Wishkah, which is a part of the system, is about half completed and about two miles of pipe are still to be laid. A supply of 15,000,000 gallons of water daily will be available, which is sufficient to supply a city of three times the present population of Aberdeen. All the work on the water project has been done by day labor and city engineer L. Kelsey, who has had charge of the work, declares that he will be able to show a considerable saving in the cost of the pipe line over the lowest bid which was received on the work before the city decided to carry it on by the day labor. The water is taken 22 miles north of this city.

Injunction Stays Wanaque Contract.

Newark, N. J.—Upon application of Gilbert Collins, representing the Society for Establishing Useful Manufactures, the court of errors and appeals, at Trenton, has granted a temporary stay enjoining the actual execution of any contract between the North Jersey district water supply commission and any municipality of Wanaque watershed. The stay, which will be operative until the November term of the court, was made in such form, however, as to permit the continuation of preliminary arrangements up to the actual execution of the contract. Modification of the stay, first asked for by Mr. Collins, was obtained by Spaulding Frazer, city counsel of Newark, who pointed out that before the execution of any contract a number of preliminary steps, such as the approval of a form of contract and authorization for its execution, might be continued without prejudicing the case of Mr. Collins' client. This course was assented to by the court, which directed that the stay be drawn in the form suggested by Mr. Frazer, and that it be made operative until the opening day of the term, when argument will be heard on the question of continuing the stay, pending determination of the appeal of the S. U. M. from the recent decision of the supreme court, dismissing the writ of certiorari by which it was sought to enjoin the proposed contract for the construction of a reservoir or reservoirs upon the Wanaque watershed.

New York Aldermen Think Water Free as Air.

New York, N. Y.—The board of aldermen has definitely and finally rejected an ordinance proposed by commissioner William Williams of the Department of Water Supply, Gas and Electricity, providing for compulsory installation of water meters in apartment houses, although the commissioner had modified his original proposition so as to include only elevator apartment houses. This action was taken on the recommendation of the committee on public welfare. The committee reported that, having held three public hearings and being impressed with the fact that the public is "almost unanimously" opposed to the use of water meters in any class of apartment houses, it felt that the commissioner's request ought to be rejected. In the opinion of the committee, "water should be as free as air." In a communication to the board commissioner Williams explained that the ordinance as modified would affect only about 2,100 dwelling houses in Greater New York. "I write you this letter," he said, "so as to make perfectly clear the department's position and recommendation. Most of the opposition at the three hearings held by the Welfare Committee proceeded from persons having no interest whatever in the limited number of buildings to which the department from the outset intended its resolution to refer and to which the resolution as amended does refer."

STREET LIGHTING AND POWER

Cost of Park Lighting.

Washington, D. C.—The recently published report of director Rogers of the Bureau of Census on General Statistics of Cities for 1916, dealing with park and recreation facilities, contains interesting data on the cost of lighting in parks. Eighteen cities have reported the rates per kilowatt-hour in force, as shown in the accompanying table. Differing conditions and restrictions in lighting contracts are given as the reasons for some of the variations in rates. These may be affected by franchise considerations or street privileges or other matters of a similar nature:

City	Rate per Kw.-hr.	City	Rate per Kw.-hr.
St. Louis, Mo.	$0.03¾	Wilmington, Del.	$0.05
Baltimore, Md.	0.02	Okla. City, Okla.	0.06
Los Angeles, Cal.	0.04	Peoria, Ill.	0.04
Buffalo, N. Y.	0.07	Wichita, Kan.	0.05
Seattle, Wash.	0.03½	El Paso, Tex.	0.08
Portland, Ore.	0.02¼	York, Pa.	0.10
Toledo, Ohio.	0.05	Topeka, Kan.	0.05-0.07
Dayton, Ohio.	0.04	Colorado Spgs., Col.	0.03
Kansas City, Kan.	0.06	Zanesville, Ohio.	0.03

Commission's Gas Rate Decision Taken to Court.

Providence, R. I.—Alleging that the Public Service Commission has no authority to order suspension of a proposed increase in gas rates, pending investigation, the Providence Gas Company has filed an appeal from such action with the supreme court. The gas company filed notice of a proposed increase in rates, which was to go into effect Oct. 1. The Public Service Commission denied permission for the raise until further investigation was made. In its petition on appeal filed by the gas company it says that the proposed schedule of rates was filed wth the Public Utilities Commission Aug. 20 to become effective Oct. 1. On Aug. 29 the commission gave notice to the gas company that after the expiration of 10 days it would proceed to investigate the reasonableness of the rates in

the schedule. A hearing was begun Sept. 24, when certain facts and arguments were presented, and the commission requested the company to furnish other figures and data at a continuance of the hearing. The order of the commission is alleged to contravene the constitutions of the state and of the United States. Citation is asked to issue to the Public Utilities Commission and the cities of Providence and Cranston and the towns of Johnston, Smithfield, Warwick and East Providence. The gas company asked the court to reverse the order of the commission. The contention of the counsel for the Providence Gas Company is that the rates in the new schedule were the legal rates as soon as they went into effect on the morning of Oct. 1. The commission ordered suspension of the new rates on the same afternoon. The gas company contends that the Public Utilities Commission "is without power or authority to suspend the operations of said schedule of rates until and unless said Public Utilities Commission has, after a hearing and investigation under the provisions of the statutes, found said rates to be unjust, unreasonable, insufficient or unjustly discriminatory, or to be preferential or otherwise in violation of any of the provisons of the statutes." The order of the Public Utilities Commission "is unlawful and unreasonable in that it was entered without said Providence Gas Company being given any opportunity to be heard in the premises," says the petition filed with the court. Also the order is declared to be unlawful and unreasonable "in that it prohibits the Providence Gas Company from charging the rates in said schedule of rates, even though said Public Utilities Commission might be required to find, upon a hearing on the merits of an investigation, that said rates are proper, just, reasonable and fair." The gas company further contends that the order of the Utilities Commission is unlawful and unreasonable "in that it is based upon a finding of the Public Utilities Commission that sufficient facts have been established before said Public Utilities Commission simply to raise a question as to the reasonableness of said rates, whereas said Public Utilities Commission is authorized and empowered by law to suspend rates only upon a finding that said rates are unjust, unreasonable, discriminatory or otherwise in violation of the statutes." Meanwhile the hearings continue.

City Sues on Franchise Contract.

Oshkosh, Wis.—Whether or not the Eastern Wisconsin Electric company will be required to continue paying the city of Oshkosh $1,000 a year for the remainder of a thirty-five year period in accordance with a franchise contract entered into between the city and the Eastern Wisconsin Railway and Light company, predecessor of the Eastern Wisconsin Electric company, is to be determined by the courts. Following the latter company's refusal to pay the $1,000 due this year under the terms of the franchise and the instructions of the commission council, corporation counsel Frederic J. Eaton has instituted in the Winnebago county circuit court, in behalf of the city, an action to compel the Eastern Wisconsin Electric company to make the payment. In the complaint it is recited that the Eastern Wisconsin Railway and Light company is now and was a corporation existing under the laws of Wisconsin and operated under the terms of a franchise passed by the Oshkosh common council November 10, 1903, an interurban electric railroad into Oshkosh from Fond du Lac up to March 1, 1917, when the line was sold to the defendant, the Eastern Wisconsin Electric company; that the latter company is the successor of the former and is now operating the railroad into Oshkosh by virtue of the privileges granted to the former in the franchise referred to. It is also stated that November 10, 1903, the city of Oshkosh passed an ordinance granting the Eastern Wisconsin Railway and Light company, "its successors and assigns" the right to lay and maintain a single or double track along certain streets and along the Main street bridge. The ordinance expressly stipulated that, in return for this privilege, the Eastern Wisconsin Railway and Light company, "its successors and assigns" was to pay the city $35,000, in payments of $1,000 a year on or before July 1 of each year for thirty-five years. It is stated that the company accepted the terms and conditions of the franchise and a copy of the written acceptance is made a part of the complaint. After the acceptance of the franchise, the Eastern Wisconsin Railway and Light company paid to the city $1,000 a year in accordance with its conditions from the time it was granted up to and including the payment July 1, 1916. On March 1, 1917, the Eastern Wisconsin Railway and Light company sold its railway to the Eastern Wisconsin Electric company and that the latter thereupon assumed possession of the property and liabilities and all the provisions of the franchise, and the complaint says that it is operating the same as the successor and assign of the former company, but has failed to make the payment of $1,000 due July 1, 1917.

FIRE AND POLICE

Four Departments Save Coal Stores.

Gary, Ind.—Fire departments of four cities were required to extinguish a fire which recently threatened the destruction of 171,000 tons of coal in a Michigan Central reserve yard in East Gary. The blaze was controlled after nearly 100,000 tons were destroyed. Firemen were sent to the scene from Gary, Hammond, East Chicago and Michigan City.

Soldiers Help Fight Fire.

Lawton, Okla.—Lawton suffered fire damage recently estimated at $150,000. The fire started in a junk shop and the flames rapidly spread to an ice cream factory next door and then to a hotel. In less than half an hour the whole side of the block was in flames. Explosions of tanks in the ice cream factory blew pieces of machinery many feet in the air. The fire rapidly spread to the avenue. A great many stores and residences were destroyed, all frame buildings. Fort Sill officials were notified and immediately sent in their fire-fighting outfits, engines, hose and men. Many hundred soldiers were sent to do patrol duty. Truck after truck brought hose and men and the men were used in relays that proved effective. The business district was put under martial law immediately following the fire. The loss on stocks was heavy. The rate demanded by the companies in these districts was high and many of the business men carried but little insurance. Several of the soldiers were injured by falling timbers and some of them burned severely.

Policewoman for Duluth.

Duluth, Minn.—Commissioner of public safety Silbertein has announced the appointment of Miss R. P. MacGregor as policewoman. Miss MacGregor, who will assume her new duties on Oct. 1, will be the first policewoman in the city of Duluth and she will have all the powers of a member of the local police force. Miss MacGregor will receive $75 a month, the regular salary for new patrolmen. In making the announcement of Miss MacGregor's appointment, commissioner Silberstein said that the new policewoman will make it a point to protect young girls, especially on downtown streets and in dance halls throughout the city. She will have police powers and authority to make arrests. The appointment of Miss MacGregor was recommended by police chief McKercher. Miss MacGregor has been a nurse at the Children's home for the last six years.

Police Commissioner Shot by Discharged Man.

Fort Worth, Tex.—Edward Parsley, fire and police commissioner, was shot and killed in his private office in the city hall by J. K. Yates, former police inspector, who, in turn, was shot to death by officers after he had barricaded himself in the commissioner's office. Yates had threatened both mayor Davis and commissioner Parsley, it is said, and went to the city hall seeking the mayor. Not finding him, Yates went to Parsley's office. A fusilade of shots was fired and officers rushed upstairs to find the door barricaded. Chief of police Montgomery sent for riot guns and a furious exchange of shots through the door to the commissioner's office followed. The door finally was broken in and the former police inspector's body was found riddled with bullets. Mayor Davis and commissioner Pars-

ley took office after the last city election. When appointments were made to the police force Yates' name was not on the list. Friends said that Yates had been brooding over the loss of his position, and it is reported he had threatened to "clean up" at the city hall unless put back to work. A special election has been called for the purpose of naming a successor to the dead commissioner.

Big Stockyards Fire.

East St. Louis, Ill.—Several hundred horses were burned to death in a big blaze which swept the National stockyards and caused damages totalling almost half a million dollars. The stockyards hotel, which had 300 rooms, was wholly destroyed. Several pieces of apparatus was sent by the fire department of St. Louis, Mo.

Fireboats Fight Difficult Blaze.

Baltimore, Md.—Fire, resulting probably from spontaneous combustion, destroyed the manufacturing plant of a big guano company and damaged also the storage plant of the same company which lay alongside the burned building. The fire also threatened a nearby shipbuilding plant. On reaching the scene chief Kahl sent for the fireboat Cataract, and later for the Deluge. Fourteen lines of hose were run from the two boats to help feed the land companies with water. Chief Emerich was also on the scene by the time the third alarm had been sounded. The firemen had a difficult time in keeping the blaze from reaching the shipbuilding plant because the wind was blowing vigorously that way. The burned plant included, besides stores of guano, bagging and ammonium salt, several electric motors and a good deal of machinery, the total loss being over $200,000.

Electric Plant Burned Out.

Groton, S. D.—A late evening fire nearly wiped out the power plant of the Groton Light, Heat and Power company and left the city in darkness, fire starting in the east end of the building above the steam boiler. The fire had already spread to the upper part of the building and some distance west when discovered. Delay in getting the fire fighting apparatus to the scene of the conflagration allowed the flames to gain such headway that there seemed small hope that anything would be left of the plant. However, the walls of the building being of cement block construction, by good work on the part of fire chief Rathbun, assisted by W. J. Paetznick and others, the fire was confined to the ceiling and roof of the main part of the building and after several minutes of hard fighting was gotten under control. The steam power unit and the gasoline power unit which were located in the main room of the building were put completely out of commission by the intense heat and falling debris. Fortunately the Muncie oil engine, which was located to the west, and the generator with which it was connected, located in the addition on the north, were not injured, thus leaving one complete generating unit which was put into shape as rapidly as possible and with which the company was able to furnish a limited service.

GOVERNMENT AND FINANCE

Police Chief-Mayoralty Candidate Dies.

Toledo, O.—Former police chief George A. Murphey, who had been nominated as third candidate to run for the position of mayor in the coming election, died following a number of operations. The death has complicated the election situation, as the charter and the primary election regulations make no provision for such a contingency, merely requiring that the three highest candidates at the primaries be nominated. Regarded by many of his friends and followers as "the mayor without an office" because he received the highest number of first choice votes under the preferential system of voting for mayor two years ago, Murphey left a strong imprint upon the political history of the city. He was traffic officer near city hall when former mayor Keller assumed office. Keller appointed him chief of police January 28, 1914. Incident to the change of political policies and affiliations which marked the beginning of his second year in office, mayor Keller removed Murphey from the head of the police department, a year after his appointment. Murphey, with characteristic energy, refused to submit tamely to removal. He made a fight before the civil service commission, which modified the mayor's order and reduced Murphey to a patrolman. Murphey never reported for duty as patrolman, and eventually was dropped from the rolls. Following the prediction that if Keller removed Murphey as chief, the action would make Murphey mayor, a movement for Murphey was started soon after his dismissal. Without financial means of his own, Murphey led a fight in which he outran his former superior in the election, leading all the candidates in first choice votes. Early in Mayor Milroy's term Mr. Murphey was restored to the police rolls and assigned to duty as a detective, but later obtained leave of absence. Murphey was first appointed a patrolman by the board of police commissioners April 15, 1903.

Commission Form Adopted

Albuquerque, N. M.—This city has decided in favor of the commission form of government. The election resulted in a substantial majority for the new charter. The new form was opposed by the politicians and the local morning paper. The evening paper backed the commission plan.

Public Service Corporations in West Virginia.

Charleston, W. Va.—The grand total of assessments of all the public service corporations of the state, as made by the state board of public works for the year 1917, is $336,430,869.99, an increase of about $15,000,000 over last year, according to the announcement by secretary of state Houston G. Young who is secretary of the board. Steam railroad companies in the state were assessed at $187,115,300, a decrease of $164,700; street railway companies were assessed at $15,441,000, an increase of $485,000; express companies were assessed at $547,024.95, an increase of $31,424.95; private car line companies were assessed at $612,244, a decrease of $10,755; bridge and ferry companies were assessed $1,909,700, an increase of $413,500; electric light, water and power companies were assessed at $12,090,455, an increase of $1,878,589; oil and gas companies were assessed at $112,003,500, an increase of $10,373,008; telephone and telegraph companies were assessed at $6,711,646.04, an increase of $640,322.57. The Baltimore & Ohio Railroad has by far the largest single assessment of all the public service corporations in the state, it being rated at $78,000,000. The Norfolk & Western Railroad is second largest, with an assessment of $35,000,000. The assessments were made by the board after several weeks of consideration of oral statements and written briefs presented by representatives of the several companies concerned.

TRAFFIC AND TRANSPORTATION

Four-Cent Tickets Abolished.

Seattle, Wash.—The sale of twenty-five car tickets for $1 has been discontinued by the Puget Sound Traction, Light & Power Company, in accordance with a decision of the public service commission, dismissing the protest of the city of Seattle against the company's tariff supplement, which provides for a straight 5-cent fare. The only exception to the flat rate is that of 2½ cents for school children during the school year, which will be continued by order of the commission. In the contention over the franchise tax on its gross earnings the company suffered a legal reverse that will result in the city taking judgment for $64,387.78, the amount of 2 per cent of its gross earnings for 1916. Corporation counsel Caldwell asked the superior court of Thurston county for a writ of review on the grounds that the public service commission had never made a valuation of the properties of the Puget Sound Traction, Light & Power Company, and that the public service commission act provided that nothing contained therein should prevent issuance of commutation tickets. "While the public service commission disposed of the 4-cent fare issue with great speed," said Mr. Caldwell, "they still have not decided my motion to dismiss the company's application to be relieved of all its franchise obligations."

In assuming jurisdiction the commission has raised a legal point that may be fought out in the supreme court before a settlement is reached. The city of Seattle protested against the filing of the new tariff section which eliminated the 4-cent fare. The city contends that the commission has no jurisdiction by reason of the fact that the sale of the 4-cent tickets in books of twenty-five each is a provision contained in the charter under which the company is permitted to operate in Seattle, and that the state body has no right to void a franchise provision. The commission, however, has assumed jurisdiction. The commission said in part: "This commission has never determined the value of the company's railway system in Seattle. One of the general officers of the company testified at the hearing that his company was at large expense to determine the actual money which has gone into the system, exclusive of the power plant, and that the net amount which has gone into the system (exclusive of power) as in use is approximately $15,000,000. In Seattle the company for the first six months of 1917 received an average fare per revenue passenger of 4.67 cents, while the average revenue received from all passengers was 3.46 cents. We find the average length of line in Seattle is 5.16 miles. The longest haul for 5 cents is 17.953 miles, the longest haul for 4 cents is 9.837 miles. Late increases in trainmen's wages amount to $130,000 a year. A reduction in the working day from nine to eight hours in the shops and power houses amounts to $2,000 a month, or $24,000 a year. (The eight-hour day is one of the problems which the arbitration board now in session will settle.) A reduction from nine to eight hours in track and paving work amounts to $1,100 a month, or $13,200 a year. The elimination of the 4-cent ticket and the substitution of a straight charge of 5 cents will increase the revenues of the company approximately $150,000 a year." The writ of review was granted. In applying for it the corporation counsel held: "That the order signed by the commission was and is unreasonable and unlawful, especially in that it assumes that $15,000,000 is the value of the railway properties of the company when, in truth and in fact, the commission has never determined the valuation of the respondent's system in Seattle, and had before it, at the time of accepting said valuation as the basis of its order that the 4-cent ticket was an unreasonably low rate, no competent evidence of the value of the company's property upon which it should be permitted to figure a reasonable return. That the commission is not authorized by law to direct or permit the elimination of a commutation ticket which the company has specifically agreed to furnish and sell as a condition to its right to occupy the streets of Seattle. That the commission based its order upon incompetent and secondary evidence, and denied to the complainant, the city of Seattle, the right to cross-examine witnesses and the right to examine the evidence considered by the commission."

Engineering Society Disapproves Transit Plan.

Cleveland, O.—The executive board of the Cleveland Engineering Society has issued a report on the proposed rapid transit commission ordinance, to be voted on at the November election. This report, which follows one made to the board by a special committee, disapproves of the plan in the ordinance. The board thinks that the City Planning Commission should first make a careful study of the subway matter, develop plans and acquaint the citizens with the details of the improvement. After this, the committee feels, it might be advisable to appoint a commission under the provisions of the state law to execute these plans. According to the board, only in this way will it be possible to formulate plans for both the present and future needs, and it is argued that whatever is done in the way of improvements to meet immediate demands should be a part of a general scheme which will also be adequate for the future growth of the city. The society emphasizes that it is not opposed to the construction of subways, but that the members believe that subways and underground terminals are necessary now. It is felt, however, that such an important improvement should be well planned, so that there may be no mistakes that might block extensions later on.

LEGAL NOTES

A Summary and Notes of Recent Decisions—Rulings of Interest to Municipalities

Ditch Dug by City—Liability of City.

(Texas Civ. App.) Where a city itself directed the digging of a ditch across a sidewalk, and at the time of an accident it was in practically the same condition as when it was opened, the city could not claim ignorance of the defect.—City of Henderson v. Fields, 194 S. W. 1003.

Bond Issuing Power of Municipalities for Filter Plants.

(Ohio.) Gen. Code, § 1259, confers independent bond issuing power on municipalities to provide funds to comply with orders of state board of health requiring installation of filtration plant.—State v. Dean, 116 N. E. 37.

Maintenance Bonds.

(Texas Civ. App.) Judgment permitting city to retain money due street improvement contractor in lieu of maintenance bond should be modified to protect right to unused portion of the fund at the end of the maintenance period.—Lion Bonding & Surety Co. v. First State Bank of Paris, 194 S. W. 1012.

Police Power—Definition.

(New York Sup.) "Police power" of city means power to prevent, anticipation of danger to come, active and earnest interest to protect people, and in so doing to curb and restrain individual tendency.—Mannix v. Frost, 164 N. Y. S. 1050.

Obstruction in Street—When Actionable.

(W. Va.) Not every obstruction to use of street whether authorized by municipal corporation or not, irrespective of its character or purpose, constitutes a nuisance or is actionable in damages; as right to use of street is subject to necessary limitations.—Johnson v. City of Huntington, 92 S. E. 344.

Maintaining Waterworks Not Governmental Function.

(Ky.) A city in maintaining waterworks is in the exercise of a private, as distinguished from a governmental function, and so liable under the same circumstances as an individual for injury to another through its servants' negligence.—Flutmus v. City of Newport, 194 S. W. 1039.

Reasonableness of Ordinance.

(Tex. Civ. App.) Question as to reasonableness or unreasonableness of ordinances is open to inquiry, unless expressly authorized by the legislature.—Munger Oil & Cotton Co. v. City of Groesbeck, 194 S. W. 1121.

Police Power—Health Ordinances.

(Ill.) The most important police power of the municipality is that of caring for the safety and health of the community, and ordinances for that purpose should be liberally construed.—Biffer v. City of Chicago, 116 N. E. 182.

Sewer System—Failure to Construct.

(Wis.) Although a village has power to lay out a general sewer system, it is not liable for failure to do so to an individual property owner who claimed his ponds had become contaminated.—Crystal Spring Brook Trout Hatchery Co. v. Village of Lomira, 162 N. W. 658.

Contract Work Under Burdensome Conditions—Extra Pay.

(Oregon.) So far as work done without their contract by contractors with a city to erect a dam conforms to the contract in character and in the conditions under which it is done, the contract price will govern the contractors' extra recovery on a quantum meruit against the city. When contractors with city to erect dam did extra work under burdensome conditions not within contemplation of parties, deviations from contract being so material as to entitle contractors to recover on quantum meruit, recovery allowed should take form of damages adequate to compensate for additional burdens which damages should be added to contract price.—Hayden v. City of Astoria, 164 P. 729.

THE MUNICIPAL INDEX

In Which Are Listed and Classified by Subjects All Articles Treating of Municipal Topics Which Have Appeared During the Past Month in the Leading Periodicals.

It is our purpose to give in the second issue of each month a list of all articles of any length or importance which have appeared in all the American periodicals and the leading English, French and German ones, dealing more or less directly with municipal matters. The Index is kept up to date, and the month of literature covered each time will be brought up to within two or three days of publication. Our chief object in this is to keep our readers in touch with all the current literature on municipal matters. In furtherance of this we will furnish any of the articles listed in the index for the price named after each article, except that where an article is continued in two or three issues of the paper, the price given is for each of said issues. In addition to the titles where these are not sufficiently descriptive or where the article is of sufficient importance, a brief statement of its contents is added. The length also is given, and the name of the author when it is a contributed article.

ROADS AND PAVEMENTS.

Bituminous:

Bituminous Surfaces for Macadam Roads. From a report of the Ontario Highway Dept. 1,500 words. Engineering and Contracting. September 5. 10 cts.

Bituminous Concrete for Patching Roads. How to properly repair depressions and maintain a smooth surface. By A. H. Hinkle. 1 ill. 1,700 words. Better Roads and Streets. September. 15 cts.

Bituminous Foundations for Sheet Asphalt Surfaces. Letters from H. W. Skidmore and R. M. Green. 1,200 words. Engineering News-Record. September 27. 15 cts.

Combination Roads to Sustain Traffic Weights. By D. T. Pierce. 3 ills. 2,500 words. Better Roads and Streets. September. 15 cts.

Bituminous Wearing Surfaces for Highway Bridges. Illinois Highway Department has been using bituminous mastic and bituminous concrete with success. Latest specifications for both types. 1,100 words, Engineering and Contracting. September 26. 10 cts.

Construction of National Pavement in New Jersey. Methods of laying this pavement, which consists of finely divided earth and asphalt. Motor trucks used for hauling. 5 ills. 1,300 words. Good Roads. September 29. 10 cts.

Brick:

Bituminous-Joint Brick Pavement Still Preferred. Warren, Ohio, has excellent results with asphalt joints. 800 words. Engineering News-Record. September 27. 15 cts.

Concrete:

Street and Road Pavements. This article has a special reference to concrete. 2 ills. 3,500 words. Cement and Engineering News. September. 20 cts.

Contractors Roll-Finish Concrete on Five Vermilion County Roads. Four sizes of rollers give good finish. Roller 12-in. by 4 ft., weighing 56 lbs., most convenient. Rolling squeezes out water and sinks coarse aggregate below surface. 1 ill. 1,000 words. The Contractor, September 28. 10 cts.

Reinforced Concrete Wheel Tracks for Roadways. 1 ill. 1,000 words. The Surveyor. August 24. 40 cts.

Repair of Concrete Pavements; Cracks and Joints. By A. H. Hinkle. 2,500 words. Concrete Highway Magazine. September. 10 cts.

Concrete Road Construction on a Water-Soaked Sub-Grade. 1 ill. 400 words. Engineering and Contracting. September 5. 10 cts.

Apportion Concrete Mixture on Road Job at Loading Hoppers. Motor Truck makes 7 miles an hour. 4 ills. 750 words. Engineering News-Record. September 6. 15 cts.

Resurfacing an Old Road with Concrete. Machinery and methods used in the reconstruction of an old road. Motor trucks for hauling aggregates. 4 ills. 1,600 words. Municipal Journal. September 13. 10 cts.

Concrete Pavement Specification of Ohio State Highway Department. 3 ills. 1,000 words. Engineering and Contracting. September 5. 10 cts.

Construction:

Permanent Road Building in Contra Costa County, California. By R. R. Arnold. 3 ills. 1,000 words. Concrete Highway Magazine. September. 10 cts.

Laying Pavements in Alleys, Description of methods used on such work in Baltimore. By Daniel J. Hauer. 2 ills. 1,000 words. Cement Era. September. 20 cts.

Widening and Straightening a Connecticut Highway. Replacing one grade and two overhead crossings by concrete arch bridge. Making a fill while maintaining a way for traffic. Steam shovel for light and heavy grading. 10 ills. 1,600 words. Municipal Journal. September 13. 10 cts.

Subgrade Not Rutted Where Concrete Materials Are Hauled Over Track Laid on Street. Power-dumping batch-sized cars are used. Extra wagon keeps cement and sacks dry and saves handling. Screening methods produce waveless surface with minimum of labor. 8 ills. 1,100 words. The Contractor. September 28. 5 cts.

Boxes on Motor Trucks Facilitate Handling of Road Materials. 500 words. Engineering and Contracting. September 5. 10 cts.

County and Town:

Town and County Highway Data. Information concerning road construction in towns and counties in many states. Construction details and costs and methods of surface treatment. 4½ pages. Municipal Journal. September 13. 10 cts.

Road Improvement in Whatcom County, Washington. By Charles A. Lindberry, County Engineer. 6 ills. 2,500 words. Good Roads. September 22. 10 cts.

Construction and Maintenance of Highways in King County, Washington. By C. E. Morford and C. F. Mowry. 7 ills. 3,500 words. Good Roads. September 22. 10 cts.

Appliances Owned by Highway Authorities. Machinery owned and operated by counties and towns for highway work. 4,500 words. Municipal Journal. September 13. 10 cts.

Design:

Getting The Right Type of Road. By Rodman Wiley, Comr. of Roads, Kentucky. 1,000 words. Southern Good Roads. September. 10 cts.

The Selection of Pavements. From a paper by W. A. McLean. 1,200 words. Good Roads. September 1. 10 cts.

Side-Hill Drainage Allowed to Wash Over Roads. Between steep rock bank and lake culverts are done away and fill replaces usual retaining walls. By W. C. Slayton. 1 ill. 1,000 words. Engineering News-Record. September 20. 15 cts.

Planning County Highway Work. Abstract of paper by L. I. Hewes before Washington Assn. of County Engineers. 2,000 words. Good Roads. September 29. 10 cts.

Overflow Road Approach to Bridge Instead of Old Fill. Concrete pavement allows water to pass around the bridge as well as under it. 1 ill. 500 words. Engineering News-Record. September 13. 15 cts.

Foundations:

Pit-Run Gravel Concrete Used for Pavement Sub-Base at London. Danger of improper proportions without screening and grading; also result of too much water and of cutting down in time of mix. By R. J. Marshall. 4 ills. 2,000 words. Canadian Engineer. September 6. 15 cts.

General:

Samples of Completed Pavements Taken with Core Drill. Valuable data may be secured from use of simple machine. 5 ills. 1,000 words. Engineering News-Record. September 13. 15 cts.

Favors Continuing Iowa Road Policy. 1,500 words. Engineering News-Record. September 6. 15 cts.

Test of Concrete Road Aggregates. From a paper by J. T. Nash. 2 ills. 5,000 words. Good Roads. September 1. 10 cts.

Cost of State Aid Road Surveys in Illinois. By C. M. Hathaway, Assistant Road Engineer. 2 ills. 800 words. Engineering and Contracting. September 5. 10 cts.

Good Roads a Municipal Problem. Abstract of paper by S. L. Squire, Municipal Advisor of the Ontario Highway Dept. 1,200 words. Good Roads. September 29. 10 cts.

Grade Crossings:

Safer Grade Crossings. Recommended change in profile of road at railroad crossing. 1 ill. 600 words. Municipal Journal. Septemper 27. 10 cts.

Granite:

Italian Subcontractors Cut and Relay Old Granite Block. They work with their gangs of fellow countrymen, who have been paving stone cutters and setters in Italy and in the block quarries of this country. General contractor loosens old block, grades street and puts in concrete base and sand cushion. 3 ills. 800 words. The Contractor. September 28. 5 cts.

Gravel:

Gravel Roads. A practical talk of much interest to highway officials who have charge of roads in locality where gravel is available for use in road construction. 3,500 words. Better Roads and Streets. September. 15 cts.

Ohio River Gravel Makes Good Roads in Kentucky. Mixed with 15% of clay it gives a surface that compacts quickly. Material is pumped from river. 3 ills. 600 words. Engineering News-Record. September 27. 15 cts.

Guard Rails:

Concrete Guard Rails on Highways. By George C. Wright. 3 ills. 300 words. Concrete Highway Magazine. September. 10 cts.

Comparative Cost of Guard Rail and Flat Side Slopes or Banquettes. By C. R. Thomas. 2 ills. 600 words. Engineering and Contracting. September 5. 10 cts.

Legal:

A State-Wide County Road Law. Discussion by R. S. McCoin before the North Carolina Good Roads Convention. 2,500 words. Southern Good Roads. September. 10 cts.

The Wisconsin Law Accepting Federal Aid. Brief statement of the principal provisions of law. 1,500 words. Good Roads. September 29. 10 cts.

Iowa's Provisions for Applying Federal Aid. Full text of law passed at 1917 session. 3,000 words. Good Roads. September 29. 10 cts.

Massachusetts State Road Laws Codified. 5,000 words. Good Roads. September 1. 10 cts.

The Highway Law of Washington. 2,000 words. Good Roads. September 22. 10 cts.

New Road Laws of Michigan. Recent important changes. 3,000 words. Good Roads. September 15. 10 cts.

Macadam:

Appliances in Waterbound Macadam Construction. Gravel loaded by steam shovel directly from bank into trucks. Steam shovel used for all grading over 6 inches deep. Screening and loading gravel with one handling. Details of construction of screen devised by contractor. 4 ills. 1,000 words. Municipal Journal. September 27. 10 cts.

Materials:

Location of Road Materials. Bulletin issued by the Illinois Highway Department giving location of road building materials for the use of contractors and road officials in the middle west. 18,000 words. Better Roads and Streets. September. 15 cts.

Maintenance:

Road Maintenance in the War Zone of France. Abstract of a report from a former engineer of the U. S. Office of Public Roads to Logan Waller Page. By Wm. J. Weir. 4,000 words. Engineering News-Record. September 13. 15 cts.

Road Maintenance in Los Angeles. Oiled streets ploughed up, harrowed and rolled yearly. Sand and gravel for street work obtained from the river by permanent drag and screen. Mixing oil and gravel. By C. W. Geiger. 3 ills. 1,600 words. Municipal Journal. September 20. 10 cts.

Maintenance of Concrete Pavements. The first of a series of articles explaining practical methods of maintaining the various kinds of pavements in general use on highways and city streets. By Chas Carroll Brown. 1 ill. 3,500 words. Municipal Journal. September 13. 10 cts.

Road Types Often Condemned by Improper Maintenance. By E. H. Piepmeyer. Maintenance Engr., Illinois Highway Dept. 3 ills. 1,000 words. Engineering News-Record. September 20. 15 cts.

Sheet Asphalt:

Methods of Constructing Sheet Asphalt Pavements in New York City. Mixtures for best results under heavy traffic. Method of laying. 4 ills. 3,000 words. Good Roads. September 15. 10 cts.

State Work:

Highway Department Directory. The names and addresses of federal and state highway commissioners and engineers. 6,000 words. Good Roads. September 8. 10 cts.

State Road Work in Washington. Outline of state road system and present conditions as regards completion of work. 9 ills. 8,000 words. Good Roads. September 22. 10 cts.

Road Building in Michigan. Outlines the work of the state highway department. From an address by F. F. Rogers, State Highway Comr. 1,500 words. Good Roads. September 8. 10 cts.

Traction:

Tractive Resistance Test by the California State Automobile Ass'n. Results of tests made to determine tractive resistance on earth, gravel, macadam, tocska and concrete surfaces. 1,000 words. Good Roads. September 15. 10 cts.

Traffic:

Road Census in Iowa. Methods and results of census to secure data concerning number, weight and class of all vehicles and kinds of tires used. 1,000 words. Municipal Journal. September 13. 10 cts.

Highway Commission, Not Legislature, Should Draft Traffic Regulations. By A. N. Johnson. 1,000 words. Engineering News-Record. September 27. 15 cts.

Traffic Regulation at Right Hand Turns. Letter from A. P. Hoover. 2 ills. 1,000 words. Municipal Journal. September 27. 10 cts.

Widening Streets:

Widening a Street for Increased Traffic. Detail of work in Indianapolis. Old pavement was not relaid. 1 ill. 1,000 words. Municipal Journal. September 6. 10 cts.

Widening Existing Streets to Meet Traffic Demands. From a paper by Nelson P. Lewis. 2,000 words. Engineering and Contracting. September 5. 10 cts.

SEWERAGE AND SANITATION.

Activated Sludge:

Comparative Tests of Air Diffusers and Devices for Dewatering Activated Sludge. Abstract of paper by Edward Bartow. 4 ills. 2,500 words. Engineering and Contracting. September 12. 10 cts.

Activated Sludge Process of Sewage Purification. A resume of the present position; describes the results at Manchester, Salford, Stamford and other places. By Edward Ardern. 4,000 words. The Surveyor. August 17. 40 cts.

Filters:

Ice Forms but Sprinkling Filters Go on. Ice is sometimes 4 ft. thick on sewage filters at Rochester, but good work is done in the winter. By M. A. Bantrelling, Chemist in charge. 10 ills. 1,000 words. Engineering News-Record. September 13. 15 cts.

Construction:

Wooden Sewer Form Units Forty-five Feet Long, Moved Easily on Castors. Saw mill on the job cuts lumber for sewer forms. Traveling gravity mixer places concrete for invert. Wire rope blasting mats protect water mains only a few feet away. 3 ills. 1,000 words. Contractor. August 31. 10 cts.

Methods and Costs of Construction 4,173 feet of Large Concrete Sewer. Excavation encountered, organization and equipment, general plan of operations, excavation, hand excavation and trimming, forms, reinforcement and concrete. Lining the invert with brick, backfilling and repaving. Hauling by a motor truck. Costs. Insurance. By E. T. Thurston. 5,000 words. Engineering and Contracting. September 12. 10 cts.

Sewers:

Plant for 18 foot Sewer. How materials were handled speedily with industrial railway and mixer on track. By A. R. Reiller. 3 ills. 1,100 words. Concrete. September 20. 15 cts.

Good Sewer Work for Camp Taylor. Concrete into vitrified pipe segmental block sewer very low in spite of hurried work in saturated ground. Figures of seepage measurement. By D. R. Layman, City Engineer. 750 words. Municipal Journal. September 6. 10 cts.

Tile and Pipe:

Drain Tile Loading Specifications. By I. H. Liberton. 1,000 words. Cement Era. September 20. 15 cts.

Precast Concrete Pipe Plant Composite of Several Small Special Devices. Pipe handled by twin arm traveler. Funnel buckets, sugar scoop barrows and double cross form carriers are time-saving features. 7 ills. 1,000 words. The Contractor. Aug. 31. 10 cts.

Trade Wastes:

Problems in the Sanitation and Ventilation of Textile Mills. 2,000 words. Engineering & Contracting. Sept. 26. 10 cts.

Tannery Wastes Studied. Tests of precipitation and double filtration by government lead tanners to build and run working unit. 1,000 words. Engineering News-Record. Sept. 20. 15 cts.

Trenching:

Machinery in Trenching. Three methods of varying efficiency employed by different contractors. Trench excavators and grab buckets used in different ways. 2,600 words. Municipal Journal. Sept. 6. 10 cts.

Steam Shovel and Clam Shell Do Team Work in Digging Deep Trench. Bank sheeted behind cantilever walling as shovel dig. Structural horse sets concrete pipe. 6 ills., 1,000 words. The Contractor. Sept. 14. 10 cts.

WATER SUPPLY.

Filtration:

Filtration Controls Typhoid at Niagara Falls. Mechanical filters and hypochlorite reduce high typhoid rate to minimum and saves half a million yearly. By C. B. Burdick. 2 ills. 1,200 words. Enginering News-Record. Sept. 6. 15 cts.

Recent Progress and Tendencies in Water Filtration. Abstract of paper by John W. Alvord. 1,500 words. Engineering & Contracting. Sept. 12. 10 cts.

Rapid Sand Filtration. History of its development. Negative head; essentials of filter washing. Rate control. Red water troubles. Hoover aluminum sulphate. 2,200 words. Municipal Journal. Sept. 27. 10 cts.

Finances:

Municipal Water Department Finances. Practice of several cities as to maintaining finances and accounts separate from those of other city departments. By James Furse, Comptroller of Savannah, Ga. 1,200 words. Municipal Journal. Sept. 6. 10 cts.

Forestry:

Forestry by New Britain Water Board. 450 words. Municipal Journal. Sept. 6. 10 cts.

Water Works Plant 3,600,000 Trees in New York State. 1½ pages. Engineering News-Record. Sept. 6. 15 cts.

General:

Well Yields Different Water After Being Sealed a Year. Peculiar phenomenon at Saratoga Springs. Change from soda to salt water. By C. G. Anthony. 1 ill., 1,000 words. Enginering News-Record. Sept. 6. 15 cts.

Irrigating Flume Built with Cement Gun. Self supporting flume with 2-inch wall built up on inside forms. 130 linear ft. constructed per eight-hour shift. 4 ills., 2,000 words. Engineering News-Record. Sept. 6. 15 cts.

Laboratories for Chemical and Bacterial Tests at Small Waterworks. From a paper by R. C. Werner. 800 words. Engineering & Contracting. Sept. 12. 10 cts.

Meters and Waste:

Methods of Determining and Plotting Meter Capacity. By F. B. Nelson. 1,100 words. Fire & Water Engineering. Sept. 5. 10 cts.

Los Angeles Sets Large Velocity Meter in Open Conduit. Registers on less than one second-foot showing an efficiency greater than 98%. By J. E. Philips. 3 ills., 10,000 words. Engineering News-Record. Sept. 6. 15 cts.

Reducing Buffalo's Water Waste. Material reduction of rate of 325 gallons per capita being effected by systematically locating and stopping leaks and willful waste. 1 ill., 1,000 words. Municipal Journal. Sept. 20. 10 cts.

Akron Water Waste Survey Finds Loss in Large Meters. Isolation by sections at night to determine main leaks. Day tests for service leaks. Few underground leaks. 2 ills., 1,500 words. Engineering News-Record. Sept. 6. 15 cts.

Leakage from Vitrified Pipe Used to Convey Water Under Low Head. Abstract of paper by W. W. Brush. 2 ills., 3,500 words. Fire & Water Engineering. Sept. 12. 10 cts.

Use of Meters in Boston Metropolitan District. Consumption has been reduced 33% in 9 years. From a paper by S. E. Killam. 1 ill., 1,700 words. Municipal Journal. Sept. 27. 10 cts.

Pipe Lines:

Steel Pipe Line Covered with Concrete Without Disturbing Flow. By H. R. Case. 2 ills., 800 words. Engineering News-Record. Sept. 20. 15 cts.

Pumps:

Design and Constructional Features of Turbine Pumps. By A. E. L. Chorlton. 9 ills., 4,500 words. Canadian Engineer. Sept. 6. 15 cts.

Purification:

Decarbonation of Ground Water at Lowell. By F. A. Barbour, Consulting Engineer. 1,200 words. Fire & Water Engineering. Sept. 5. 10 cts.

Rates:

Municipal Works Rate Revision. Summary of and conclusion from the investigation of water rates made by City of Waltham. 1,200 words. Municipal Journal. Sept. 27. 10 cts.

Rate Revision in Municipal Work. Paper before the New Eng. W. W. Assn. By Bertram Brewer. 2,000 words. Municipal Journal. Sept. 20. 10 cts.

Reservoirs:

Cabbage Tree Creek Reservoir of Brisbane, Australia. 2 ills., 800 words. Engineering & Contracting. Sept. 12. 10 cts.

Design and Construction of a Reinforced Concrete Covered Reservoir. From a paper by H. F. Blomquist. 4 ills., 2,500 words. The Cement Era. Sept. 20 cts.

Reconstructing Compton Hill Reservoir. Waterproofing with asphalt. Cut off wall of interlocking steel sheet piling. Extending pipes of slope by concrete retaining wall. 3 ills., 4,000 words. Municipal Journal. Sept. 6. 10 cts.

Lansing Concrete Reservoirs. Novel details in design and construction methods. Distributing concrete without the use of tower and chutes. Beam and girder roof. By F. G. Gordon. 4 ills., 1,500 words. Municipal Journal. Sept. 6. 10 cts.

Societies:

Papers from the New England Water Works Assn. To-days' Problems in Water Works Management, by C. M. Saville; Meters Cut Waste in Metropolitan Water District, by Samuel E. Killam; Rapid Sand Filtration Holds World's Record, by George A. Johnson; Mechanical Filter Bottoms and Strainer Systems, by Robert Spurr Weston; Leadite Joints Saved $2,800 on Single Contract, by Homer R. Turner. 6,000 words. Engineering News-Record. Sept. 20. 15 cts.

36th Annual Convention of the New England Waterworks Assn. 11 ills., 4,000 words. Fire & Water Engineering. Sept. 19. 10 cents.

Convention of the New England Water Works Association. Papers, discussions and other features of the 36th annual convention at Hartford are given fully. 11,000 words. Municipal Journal. Sept. 20. 10 cts.

New England Water Works Assn. Its steady growth in 35 years due to the efficient work of its officers. Big increase of membership during past two years brings the total up to 1,043. Places where past conventions were held and names of presidents. 1,500 words. Fire & Water Engineering. Sept. 5. 10 cts.

Thawing Mains:

Thawing Water Mains and Service Pipes. Describes the methods followed by the New York Edison Co., the Queens Co. Water Co. and the water departments in Columbus and St. Paul for freeing frozen service pipes and small distribution mains. 5,000 words. 3 ills. Fire & Water Engineering. Sept 5. 10 cts.

Waterworks:

The Little Rock Water System. Report of National Board of Fire Underwriters. 1,200 words. Fire & Water Engineering. Sept. 12. 10 cts.

Hartford Waterworks. History of works, details of recent improvements, work at the reservoir, spillway details and seam grouting in foundation rock. From papers presented at the Convention of the New England Waterworks Assn. 1,500 words. Municipal Journal. Sept. 27. 10 cts.

New Jersey's Big Cantonment City Will Have Surface Water Supply. Fine sand and clay at Camp Dix an objection to wells. Pumping plant feeds three-mile force main. Both cast-iron and wood stave pipe are used. Many trenching machines are in service. By R. K. Tomlin, Jr. 11 ills. 2,200 words. Engineering News-Record. Sept. 6. 15 cts.

The Hartford Water Works. Description of the past and present works and of plans for the feature. 8 ills. 5,000 words. Fire & Water Engineering. Sept. 5. 10 cts.

Water Works Statistics. Special report from many cities indicating source and kind of supply, number of reservoirs and pumps, type and capacity of filtration plant and giving information concerning mains, services, rates, expenses and income. 4 pages. Fire & Water Engineering. Sept. 5. 10 cts.

Waltham Water Works Notes. Preparing plans of system. Reducing waste by metering. Action of water on brass pipes. 1,000 words. Municipal Journal. Sept. 6. 10 cts.

Recent Improvement in Wilmington's Water Supply. Rapid filtration plant with turbine driven centrifugal pumps constructed to supplement slow sand filters. both will be operated side by side. New filters have a capacity of 12,000,000 gallons a day. By E. M. Hoopes, Jr., City Engineer. 6 ills. 5,500 words. Municipal Journal. Sept. 6. 10 cts.

Wells:

Large Well Sunk by Open Caisson Method. Open excavation inside concrete rings for 45-ft. deep well 25 feet in diameter. By C. B. Coe. 2 ills., 1,500 words. Engineering News-Record. Sept. 6. 15 cts.

LIGHTING AND POWER.

Lighting:

Street Lighting Poles and Lamp Supports. The third in a series of articles on street lighting for small cities and towns. An outline of equipment that has been found adaptable for small cities, residential and business sections with overhead and underground equipment. By James R. Cravath. 9 ills., 2,000 words. Electrical World. Sept. 15. 10 cts.

Lighting Streets in Residential Sections. General principles for observants in lamp spacing and location with overhead circuit under the conditions normally found to exist in small towns and cities. By J. R. Cravath. 9 ills., 2,200 words. Electrical World. Sept. 22. 10 cts.

Effect of the War on Street Lighting. Though prices are the highest in the history of the industry and the status of the bond market is not favorable for raising funds, the outlook is favorable. 2 ills., 1,000 words. Electrical Review. Sept. 1. 10 cts.

Lighting Standards in Rochester. How the standards are made. By R. W. Post. 4 ills., 500 words. Concrete Highway Magazine. September. 10 cts.

Floodlight From the Standpoint of Safety. 10 ills., 2,000 words. Safety Engineering. August. 25 cts.

Miscellaneous:

Notes on the Electric Storage Battery. 36 ills., 10,000 words. From a paper by E. W. Smith, Enginers' Club of Philadelphia. September. 35 cts.

Electricity in the National Army Cantonments. 8 ills., 3,500 words. Electrical Review. Aug. 25. 10 cts.

Reducing Labor and Increasing Efficiency in the Boiler Room. By J. H. Edsall. 13 ills., 6,000 words. Electrical Review. Sept. 15. 10 cts.

The Importance of Scientific Feed-Water Regulation. By R. W. Andrews. 8 ills., 4,500 words. Electrical Review. Sept. 15. 10 cts.

Power Plants:

Unique Features of the New Power Plant at Murphysboro, Illinois. Electric, water and gas plant in a small city being reconstructed in a novel way. 1 ill., 1,250 words. Electrical Review. Sept. 8. 10 cts.

Unique Features of the New Power Plant at Murphysboro, Illinois. The second of two articles describing the reconstruction of a combination electric, water and gas plant in a small city. 7 ills., 1,700 words. Electrical Review. Sept. 15. 10 cts.

Data on Leading Steam-Electric Plants. Lists of principal equipment used in the most modern steam turbine driven electric generating station. 22 ills., 11 pages. Electrical Review. Sept. 15. 10 cts.

New Power House at Swift Rapids, Ont. Power development on Severen River. Details of machinery. 5 ills., 1,200 words. Canadian Engineer. Sept. 13. 15 cts.

FIRE.

Chiefs and Two Platoons. What heads of fire department say about working under new system. 800 words. Fireman's Herald. Sept. 15. 5 cts.

Platoons for Tacoma. 1,200 words. Fireman's Herald. Sept. 22. 5 cts.

San Diego Fire Service. Report of National Board of Fire Underwriters. 1,200 words. Fire & Water Engineering. Sept. 19. 10 cts.

To Check School Fire Hazards. New York Bureau of school buildings to introduce city-wide inspection to safeguard pupils. 800 words. Fireman's Herald. Sept. 8. 5 cts.

Fire Prevention and Inspection by Members of the Uniformed Force. By Thomas Davis, Chief, Victoria, B. C. 1,200 words. Fire & Water Engineering. Sept. 5. 10 cts.

Practical Hydraulics for Firemen. A series of articles by Fred Shepperd. 2 ills., 1,500 words. Fire & Water Engineering. Sept. 5. 10 cts. 2 ills., 2,500 words, Sept. 12, 10 cts. 8 ills., 1,400 words, Sept. 19. 10 cts.

MOTOR VEHICLES.

Table Shows Complete Average Operating Costs of Motor Trucks. By Ralph W. Horne. 800 words. Engineering News-Record. Sept. 20. 15 cts.

Motor Trucks in Portland. Details of operation. 350 words. Municipal Journal. Sept. 6. 10 cts.

Commercial Vehicle Problem in England. Fees to meet the expense of reconstructing road surfaces to carry the increased weight of commercial vehicles. 2,000 words. Good Roads. Sept. 8. 10 cts.

Tires for Motor Driven Fire Apparatus. From a paper by I. E. Daviess. 2,000 words. Fire Protection. September. 15 cts.

Adapting the Motor Truck to its Work. 1 ills., 1,250 words. Cement & Engineering News. September. 20 cts.

Motor Truck Operations in Chicago. Mileage, work done and costs. 800 words. Municipal Journal. Sept. 27. 10 cts.

Aids To Fire Prevention for Motor Truck Owners. 1,000 words. Commercial Vehicle. Sept. 1. 20 cts.

STREET CLEANING AND REFUSE DISPOSAL.

Street Cleaning:

Comparative Costs of Street Sprinkling with Motor Trucks and Horse Drawn Tanks. Report from Los Angeles. 200 words. Engineering & Contracting. Sept. 5. 10 cts.

Missouri Cities Experiment With Vacuum Street Cleaners. Machines pick up street dirt and haul to dump. Center and gutter machines used. Streets must be dry. 2 ills. 1,000 words. Engineerings News-Record. Sept. 6. 15 cts.

Street Cleaning Costs at Houston, Texas. 900 words. Engineering & Contracting. Sept. 5. 10 cts.

New Road Sweeping and Loading Machine. Description of an English Invention. 2 ills. 1,500 words. The Surveyor. Aug. 17. 40 cts.

Waste Disposal:

Problems in Waste Disposal. The general lines that should be followed in designing a garbage reduction plant. From a paper by Henry Allen. 2 ills. 2,500 words. Canadian Engineer. Sept. 13. 15 cts.

Garbage Disposal by Incineration, Reduction and Feeding to Swine. Abstract of report of Springfield Bureau of Municipal Research on conditions in and recommending a method for that city. 3,000 words. Engineering & Contracting. Sept. 12. 10 cts.

BRIDGES.

Automatic Devices Reduce Manual Labor to Minimum on Concrete Bridge. From gravel banks in river bed to concrete in form, men merely direct machine. By V. H. Drufner. 4 ills. 1,000 words. The Contractor. Aug. 31. 10 cts.

New Details Found in Quebec Span Hoisting Arrangement. General scheme employed last year retained, but radically new bearings used. New and heavier links and more jacks. 6 ills. 3,000 words. Engineering News-Record. Sept. 27. 15 cts.

Quebec Suspended Span Successfully Hung from Cantilevers. 5,400-ton structure floated 3½ miles on scows and hoisted 150 ft. by hydraulic jacks and lifting links. Work done entirely during daylight. By Harry Barker. 10 ills. 2,500 words. Engineering News-Record. Sept. 27. 15 cts.

Canadian Engineering has Triumphed at Quebec, Details of Quebec Bridge construction. 43 ills. 12,000 words. Canadian Engineer. Sept. 20. 15 cts.

Crane and Cableway Compete in Concreting Twin Bridges. Typical plants on adjoining contracts. Cableway less accurate and crane less rapid. 13 ills. 1,500 words. The Contractor. Sept. 14. 10 cts.

Culverts, Good and Bad. 2 ills. 1,200 words. Good Roads. Sept. 8. 10 cts.

Concrete Trestles Have I-Beams and Rails in Slabs. 3 ills. 1,500 words. Engineering News-Record. Sept. 27. 15 cents.

Gravity Mixer and Derricks Place Bridge Concrete. Balanced cable cars deliver concrete from gravity mixer to derricks hoisting to forms. 6 ills. 1,100 words. The Contractor. Aug. 31. 10 cts.

Economics of Bridge Design. From a lecture by J. A. L. Waddell. 6,000 words. Engineering & Contracting. Sept. 26. 10 cts.

Preferred Types of Bridges of Illinois State Division of Highways. Conditions for concrete bridges; for steel bridges; roadways. 900 words. Engineering & Contracting. Sept. 26. 10 cts.

Method of Handling Excessive Fall on Culvert Construction. 2 ills. 200 words. Engineering & Contracting. Sept. 26. 10 cts.

GOVERNMENT AND FINANCE.

New Housing Legislation of California. 1,000 words. Engineering & Contracting. Sept. 26. 10 cts.

Depreciation in the Value of Public Service Property. Advocates the use of common sense in determining present value. By A. S. B. Little. 5,500 words. Gas Age. Sept. 1. 20 cts

MISCELLANEOUS.

Simple Cost Accounting System Adaptable to Many Classes of Construction. By B. R. Leed. 6 ills. 1,000 words. Engineering & Contracting. Sept. 19. 10 cts.

Sidewalk Coal Hole Cover Safety By H. W. Mowery. 5 ills. 1,000 words. Safety Engineering. Aug. 25 cts.

Systematic Medical Care Reduces Sick Leave Costs. By Daniel J. Hauer. 1,500 words. The Contractor. Sept. 14. 10 cts.

Rapid Stadia Surveys Cover 50,000 Acres. Five-Man Parties Take Topography of Flood-control basin. Cost compared with other surveys. By L. R. Howson. 1 ill. 1,200 words. Engineering News-Record. Sept. 27. 15 cts

Proposed Standard Methods for Measuring Concrete Work. Recommendations of Committee appointed by the American Concrete Institute. 3,000 words. Cement & Engineering News. Sept. 20 cts.

Sands and Consistency of Concrete. Results of tests for determining effects of sands and consistency and time of mix on strength of concrete. By L. M. Edwards. 2,200 words. Canadian Engineer. Sept. 6. 15 cts.

Using Old Concrete With New. How to use old concrete in street work and heavy masonry and save money in purchasing aggregate. 700 words. Cement Era. Sept. 20 cts.

500 Teams Save Day in Deep Mud at Camp Lee. 2 ills. 1,800 words. Engineering News-Record. Sept. 13. 15 cts.

Buildings Stepped to Fit Hillsides at Camp Gordon, Atlanta. Light army trucks used in construction. Road work. 6 ills. 1,600 words. Engineering News-Record. Sept. 13. 15 cts.

Diagrams Facilitate the Design of Concrete Forms. By A. Norman Laird. 6 ills. 1,250 words. Engineering News-Record. Sept. 6. 15 cts.

Logging Roads Carry Lumber to Each Brigade at Columbia Camp. Topography adapted to efficient distribution. 4 ills. 2,000 words. By H. D. Hammond. Engineering News-Record. Sept. 13. 15 cts.

The City of Hartford. Brief sketch of city, describing its government and improvements. 3 ills. 1,800 words. Fire & Water Engineering. Sept. 5. 10 cts.

NEWS OF THE SOCIETIES

Calendar of Meetings.

Oct. 15-17.—SOUTHERN COMMERCIAL CONGRESS. Annual convention, New York, N. Y. Managing director, Clarence J. Owens, Southern Building, Washington, D. C.

Oct. 15-17.—NATIONAL HOUSING ASSOCIATION. Annual conference. Hotel La Salle, Chicago, Ill. Secretary, Lawrence Veiller, 105 East 22d St., New York City.

Oct. 15-17.—NATIONAL ASSOCIATION FOR STUDY AND PREVENTION OF INFANT MORTALITY. Annual meeting, Richmond, Va. Secretary, Gertrude B. Knipp, 1211 Cathedral street, Baltimore, Md.

Oct. 16-19.—LEAGUE OF KANSAS MUNICIPALITIES. Annual convention, Wichita, Kan. Secretary, Homer Talbot, University of Kansas, Lawrence, Kan.

Oct. 17-18.—LEAGUE OF MINNESOTA MUNICIPALITIES. Fifth annual convention, St. Cloud, Minn. Secretary-treasurer, Richard R. Price, University of Minnesota, Minneapolis.

Oct. 17-19.—AMERICAN PUBLIC HEALTH ASSOCIATION. Annual meeting, Washington, D. C. Acting Secretary, A. W. Hedrick, 126 Massachusetts Avenue, Boston, Mass.

Oct. 17-24.—AUSTRALIAN TOWN PLANNING CONFERENCE AND EXHIBITION, Adelaide, Australia. Organizing director, Charles C. Reade, government town planner, Education Buildings, Adelaide, South Australia.

Oct. 22-24.—AMERICAN CIVIC ASSOCIATION. Annual meeting, St. Louis, Mo. Secretary, Richard B. Watrous, 914 Union Trust building, Washington, D. C.

Oct. 28-30.—TEXAS CONFERENCE ON SOCIAL WELFARE. Annual convention, Houston, Texas.

Nov. 13.—NATIONAL TAX ASSOCIATION. Annual conference, Atlanta, Ga. Secretary, Fred R. Fairchild, Yale University, New Haven, Conn.

Nov. 14-16.—FIRE MARSHALS ASSOCIATION OF NORTH AMERICA. Annual convention, New Orleans, La. Secretary, W. M. Campbell, New Orleans, La.

Nov. 15-16.—ASSOCIATION OF URBAN UNIVERSITIES. Annual meeting, Pittsburgh, Pa. Secretary, Frederick B. Robinson, City College, New York, N. Y.

Nov. 19-24.—CITY MANAGERS' ASSOCIATION. Annual meeting, Detroit, Mich. Secretary, W. L. Miller, City Manager, St. Augustine, Fla.

Nov. 20-21.—ASSOCIATION OF GOVERNMENTAL RESEARCH AGENCIES. Third annnal meeting, Detroit, Mich. Secretary, C. O. Dustin, Statistical Bureau, Red Cross War Council, Washington, D. C.

Nov. 20-23.—PLAYGROUND AND RECREATION ASSOCIATION OF AMERICA. Recreation Congress. Secretary, H. S. Braucher, 1 Madison Ave., New York, N. Y.

Nov. 21-24.—NATIONAL MUNICIPAL LEAGUE. Twenty-third annual meeting, Hotel Statler, Detroit, Mich. Secretary, Clinton Rogers Woodruff, 703 North American Bldg., Philadelphia, Pa.

Jan. 3, 4.—NEW JERSEY STATE LEAGUE OF MUNICIPALITIES. Annual convention, Trenton, N. J. Secretary, Clinton A. Swartz, Trenton, N. J.

Jan. 15-17.—VIRGINIA GOOD ROADS ASSOCIATION. Seventh annual convention, Richmond, Va. Secretary, C. B. Scott, Richmond, Va.

Feb. 6-13.—FIRST CHICAGO CEMENT MACHINERY AND BUILDING SHOW. Supersedes annual Chicago Cement Show. Held at the Coliseum, under direction of the National Exhibition Co.

March 17-24.—PAN-AMERICAN CONGRESS ON CHILD WELFARE, Montevideo, Uruguay. Secretary, Edward N. Clopper, 105 East 22d Street, New York, N. Y.

Deeper Waterways Convention.

The tenth annual convention of this association will be held in Miami, Florida, November 27 to December 1, inclusive. An attractive program of business sessions, entertainments and outdoor events is being arranged for this "Thanksgiving Convention." There will be a motor boat pageant and races in Bay Biscayne, and an oyster roast with sports and sea-bathing at Miama Beach, one of the finest seaside resorts in America; an automobile trip on Tamiami Trail into the wonderful Everglades with their still "unreconstructed" population of Seminole Indians threading the waterways in their canoes; and other attractions, of which the announcement will be made later.

American Civic Association.

The American Civic Association will hold a convention in St. Louis, Mo., Oct. 22, 23 and 24. The program for the meeting is made public by the General Arrangements Committee, composed of representatives of the Chamber of Commerce, Civic League, Central Civic Council, Conference of Federations, Women's Federation of Clubs, Women's Council, West End Business Men's Association, North St. Louis Business Men's Asociation, Manufacturer' Association, Tenth Ward Improvement Association, Equal Suffrage League, the Junior Citizens and other organizations.

At the opening session addresses will be made by J. Horace McFarland of Harrisburg, Pa., president of the American Civic Association; Lieutenant-Governor Crossley, President Louis P. Aloe of the Board of Aldermen; John H. Gundlach, chairman of the General Arrangements Committee; J. Lionberger, president of the Chamber of Commerce, and Miss Jessie L. Moller, representing the women's organizations of the city.

In the afternoon there will be an industrial housing conference, at which the speakers will be Miss Ida M. Tarbell, the writer; Miss Margaret Walker Jordan of Fairmount, W. Va., and Harland P. Kelsey of Salem, Mass. The evening will be devoted to a local civic session, with Park Commissioner Cunliff, E. R. Kinsey, Harland Bartholomew and Mrs. George Gellhorn as speakers.

The Tuesday morning session will be a conference on small-town problems, with George B. Dealy, owner of the Dallas News, presiding. Among the speakers will be Harold A. Caparon, a landscape architect of New York; George E. Kessler of St. Louis and J. C. Nichols of Kansas City. In the afternoon the delegates will be entertained with an automobile ride through the city and Forest Park, and a reception at the Art Museum under the direction of the Federation of Women's Clubs. In the evening there will be an Ozark Park conference, with Enos Mills, the Colorado naturalist, as chief speaker.

The third day will be given up to conference on country planning and miscellaneous city problems. The visitors will be guests at noonday luncheons to be given by the Civic League on Monday, the opening day, at the City Club on Tuesday and at the Chamber of Commerce on Wednesday. The previous Sunday will be celebrated as "Civic Sunday" in the churches.

Southern Commercial Congress.

Six of the bureaus of the Department of Commerce will have exhibits at the Southern Commercial Congress, which is to be held in New York City at the Hotel Astor, October 15 to 17, 1917. In connection with the Southern Commercial Congress Convention the Southern States will hold an exhibit which will be adjoining that of the Commerce exhibit on the Belvedere Floor of the Astor. The Southern States exhibit will last from October 13 to 20, and it is the intention of the Department of Commerce to keep their exhibit intact during this period.

The subdivisions of the Department participating are, the Bureau of Foreign and Domestic Commerce, the Bureau of the Census, the Bureau of Fisheries, the Bureau of Lighthouses, the Steamboat-Inspection Service, and the Coast and Geodetic Survey.

The exhibit of the Bureau of Fisheries will deal largely with showing the work done in the past few years in developing new sea food, many species of which, heretofore unknown to the American public, have recently been placed on sale throughout the country as a result of the efforts of this Bureau. Samples of these new foods will be shown. In addition it will have a small exhibit of the pearl button industry of the Mississippi Valley; the utilization of skins of aquatic animals, showing finished leathers made from skins of the whale, porpoise, shark, sea elephant, etc. It will also have in its exhibit several of the instruments used by it in oceanographic investigations.

The exhibit of the Bureau of Foreign and Domestic Commerce will consist largely of a collection of cotton goods and wearing apparel from the Far East and South America; shoes from South America, Cuba, and the West Indies; unique implements used in various countries of the world; and possibly a large collection of general hardware supplies, and publications showing the work being done in foreign fields for the extension and upbuilding of American commerce.

The Bureau of the Census exhibit will mainly be charts and publications showing the different industries with the value of the products stated in quantities and dollars. It will have charts dealing with mortality statis-

tics, the locations of various large industries throughout the country, and a great deal of other material of a statistical nature.

The exhibit of the Bureau of Lighthouses will, in part, include a universal flashing lens and lantern, similar to that in use along the Atlantic and Pacific coasts, which will be kept in motion and lighted. In addition to this will be shown the ordinary five-day lens lantern, and eight-day post lantern, which are used along our gulf and river shores, with various models of light vessels and light tenders; maps, drawings, models of different types of buoys; models of lighthouse tenders and lighthouses, etc.

The Steamboat-Inspection Service exhibit will be of particular interest at this time; and will be one of the largest at the exhibit. It will consist of instruments of all kinds used by the Service in the inspection of hulls, boilers, fire-fighting and life-saving equipments, with models of life boats, life rafts, line-carrying gun, rocket and outfit; life preservers, etc. It will also have on exhibit condemned life preservers, fire equipment boiler plates, planking, etc. fusible plugs that failed to fuse one of which by its failure to fuse resulted in the death of 11 persons through the sinking of the steamship Jefferson. Publications, photographs, and statements will also be shown by the Bureau, in order to more clearly illustrate its work and functions.

The exhibit of the Coast and Geodetic Survey will consist largely of instruments used by the Survey in its work of surveying our coasts and placing of bench marks throughout the country. Some of these instruments are, a complete planetable alidade, and telemeter, chronographs, gimbal stand, geodetic level and rod, etc.

Special charts of the important harbors of the Atlantic and Gulf coasts will also be exhibited on screens.

Secretary of Commerce Redfield has designated the Chief Clerk of the Department, Dr. Geo. C. Havenner, to have general charge of the installation of the exhibit at the Astor.

PROBLEMS CITIES ARE STUDYING
WITH EXPERTS

The village of Lawrence, L. I., New York, is to make STREET IMPROVEMENTS. The consulting engineers for the work are Tribus & Massa.

Work is to begin at once on a new WATERWORKS SYSTEM for the city of Lockney, Tex. The consulting engineer is Henry Exall Elrod.

Minier, Ill., is to make a number of SEWERAGE IMPROVEMENTS. The engineers for the work are Melluish & Broyhill.

Little Rock, Ark., is making some STREET IMPROVEMENTS. The engineers for the work are Lund & Hill.

Oakland, Neb., is to construct a SEWERAGE SYSTEM. The engineer for the proposed improvement is P. A. Edquist.

Rainier, Ore., is contemplating the construction of a FILTRATION PLANT to cost about $20,000. Plans and specifications for the improvement are being prepared by L. C. Kelsey.

The Monroe County Road Improvement District, Clarendon, Ark., is to construct 22 miles of ROADS and a number of concrete BRIDGES and culverts. The engineers planning these improvements are the Parkes Engineering Company.

The new WATER FILTRATION PLANT of Great Falls, Mont., has just been completed and the consulting engineers for the improvement, Burns & McDonnell, have submitted a final report on inspection and tests of the plant, which was found satisfactory and up to specifications.

STREET IMPROVEMENTS are to be made by Stanberry, Mo., plans and specifications for the work having been made by the firm of Black & Veatch.

A WATERWORKS SYSTEM is to be built by Waitsburg, Wash., at an estimated cost of $50,000. The engineer retained to prepare plans is G. L. Sawyer.

WATERWORKS IMPROVEMENTS are proposed for the City of Brigham, Utah. Plans and specifications for the work are in process of preparation by H. S. Kleinschmidt.

A SEWAGE-DISPOSAL PLANT is proposed for Grand Rapids, Mich. The city has retained as consulting engineers to prepare plans the firm of Hoad & Decker.

SANITARY SEWERAGE SYSTEM is to be built by Pleasantville, N. J. Plans and specifications for the improvement have been completed by the engineers, Remington & Vosburg.

The Inter-River Drainage district, Poplar Bluff, Mo., is planning extensive DRAINAGE DEVELOPMENTS. Plans and specifications for the improvement, which is to cost about $1,240,000, have been completed by the Morgan Engineering Company.

The Palo Verde Protection district, Blythe, Cal., is contemplating the construction of an extensive LEVEE SYSTEM to cost about $1,000,000. The Federal Government is to be asked to contribute half and bonds for the remainder are to be voted on in December. The engineer retained to advise on the project is J. C. Allison.

Montana Municipal League.

The seventh annual meeting of the Montana Municipal League was held at Great Falls, September 7 and 8. The attendance at the initiatory meeting was light.

Alderman H. G. Bennet delivered the address of welcome. He reminded the gathering that the league was not in assembly for the purpose of pleasure, but for the serious business of solving various problems having to do with the operation of municipal districts in Montana.

(Continued on page 370.)

PERSONALS

Bowlby, Henry L., former state highway commissioner of Oregon, recently commissioned as captain in the engineer corps, has been ordered to report at Washington, D. C., for active duty.

Bunker, Capt. P. A., city forester and superintendent of parks of Fitchburg, Mass., has been ordered to report for active duty at Augusta, Ga.

Carraway, R. G., for the past two years district engineer with Henry E. Elrod, of Dallas, Texas, has been commissioned a first lieutenant in the Engineer Reserve Corps, and has been notified to report for active service at Fort Leavenworth.

Clarke, D. D., who has been chief engineer of the Portland, Oregon, water bureau for the past twenty years, has resigned. F. M. Randlett, who has been assisting Mr. Clarke, has been appointed to succeed him. Ben Morrow will succeed to the position formerly held by Mr. Randlett.

Gearhart, O. L., is resident engineer on the construction of concrete roads in Bureau county, Ill.

Goodman, F. R., has resigned as division engineer of the Arizona State Highway Department and has been appointed engineer for Coconino county.

Gum, Morgan T., formerly road engineer for Sussex County, Del., has been appointed to a position with the Delaware Highway Department. N. E. Hawkins has been appointed to succeed Mr. Gum.

Tefft, George H., has been made Secretary and General Manager of the Clay Products Association, a new organization which is an outgrowth of the International Clay Products Bureau, of which Mr. Tefft was secretary for eight years. During that time and for seven years previous he was secretary and sales manager for the W. S. Dickey Clay Manufacturing Co., but in the future will give his entire time to the Clay Products Association, the office of which will be at 912-914 Chamber of Commerce Bldg., Chicago, Ill.

Ulrich, R. E., assistant city engineer of Elkhart, Ind., has resigned to enter business.

Wheeler, Edward, Jr., fire marshal of Rochester, N. Y., died September 30.

Wood, William J., a member of the Indiana public service commission, died October 3 at Indianapolis.

NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

SANFORD TRUCK.

3½-Ton Machine of Strong Construction.

The motor of the model "35" 3½-ton Sanford truck is of the four-cylinder, L" head type, 4½ x 6, cast en bloc. It has 3-point suspension. It is designed to develop 37½ hp. at 1,000 r. p. m. It is mounted so as to be readily accessible without removing from the frame. Ignition is by high tension magneto; carburetor, 1½-inch side outlet. Lubrication is by geared pump, force feed system. Cooling is by centrifugal water pump and steel fan.

The clutch is a Borg & Beck three-plate dry disk of large diameter attached to flywheel of motor and entirely enclosed by cast-iron housing, attached to bell housing of motor. The machine has four speeds forward and one reverse, with maximum reduction on low gear of approximately 5 to 1. Intermediate speeds are arranged in geometrical ratio. Connection between transmission and rear axle shafts is by means of two Spicer universal joints, with tubular drive shaft and splined slip joint. The universal joints are provided with grease covers to insure proper lubrication at all times and prevent dirt and dust from working into bearings. The gear shift lever is mounted in the center, and the gears are operated on selective principle. The fourth speed is direct drive. The drive is worm, of Sheldon make.

The emergency and service brakes are mounted on rear wheels, both being of the internal toggle, wrap-up type, 2½ inches wide and 20 inches in diameter. The brakes are enclosed, protecting them from oil and grit.

The frame is of pressed steel, side channels 8 inches deep. Pressed steel cross members are used at points where rigidity is desired. The springs are semi-elliptic, front and rear, full alloy steel, properly heat-treated. The front springs are 3 inches wide and 46 inches long, and the rear ones 3½ inches wide and 54 inches long. A special type of spring hanging is provided on rear springs. The standard length of the wheel base is 174 inches. Chassis length back of seat is 12 feet, and chassis frame width, over all, 35 inches.

The wheels are heavy artillery type, with spokes mounted centrally in felloe. The rear wheels are of special construction to prevent water or dirt from working between spoke and felloe. The tires are, front, 36 x 5, single solid, and rear, 36 x 5, dual solid.

The speed of the motor is governed at 1,100 r. p. m., giving a truck speed of 13 miles an hour on high gear. The capacity of the truck, normal load, is 7,000 pounds; the maximum permissible weight on rear tires is 12,000 pounds, and on the front tires, 4,700 pounds.

The drawing on next page shows an "airplane view" of the chassis, and the photograph shows the truck itself. This recently developed machine is made by the Sanford Motor Truck Company, St. Mark's Avenue, Syracuse, N. Y.

PORTABLE OIL ENGINES AND PUMPING UNITS.

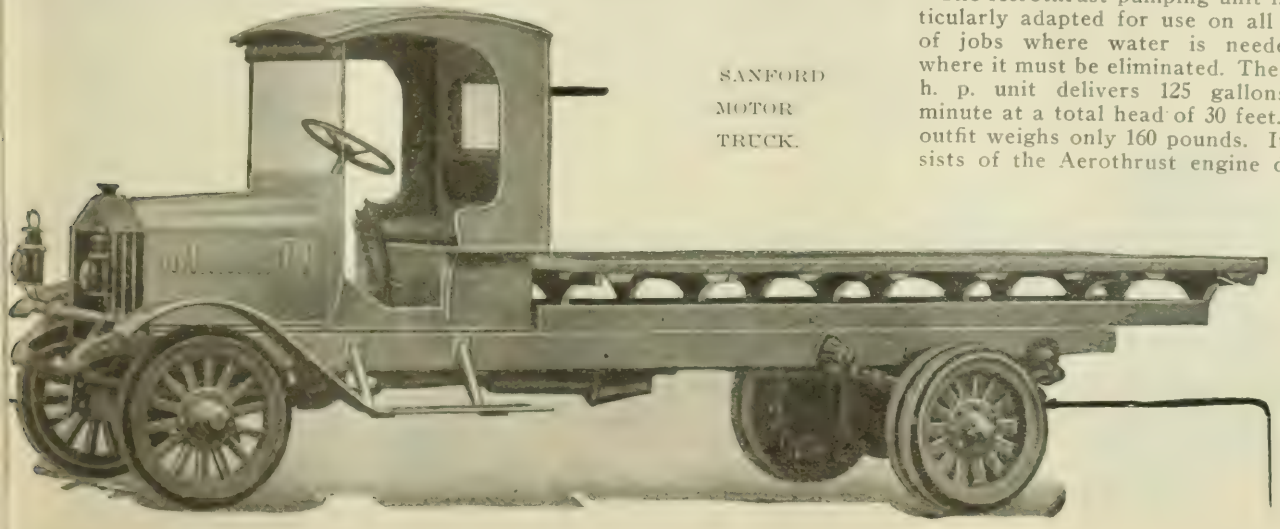
For Various Services on Construction Work.

The Aerothrust line of engines is designed and built with particular emphasis on lightness and efficiency so that their service has proved very effective on construction work where portability and reliability are important. The engines are air-cooled, two-cycle, two-cylinder, opposed, and may be run on gasoline or kerosene. In the design the heavy water jacket, water tank, large flywheel, cams and gears, necessary to the equipment of heavy water-cooled engines, are eliminated. The engine is made in three and five h. p. sizes, and is also furnished direct-connected to pumps, forming useful pumping outfits for contract work.

The three h. p. general utility engine weighs only 117 pounds. The lubricating oil is mixed with the fuel oil, thus eliminating cams and gears. The bore is 2½ inches and the stroke 2¼. The pistons are light cast iron, but strong. The crankshaft is forged in one piece from special steel. The crankshaft bearings are high-grade, die-cast removable babbitt bushings of liberal area. There is also a ball-thrust bearing to take the thrust of the propeller. The connecting rods are of highest grade nickel phosphor bronze. The carburetor is of the float feed type. Ignition is by jump spark system. The engine is cooled by means of fan blades in the flywheel, which is 14 inches in diameter, with a 2-inch face. The pulley, which is cast with the flywheel, is 3½ inches in diameter. The speeds are 900 to 1,800 v. p. m. The engine is equipped with high-tension, built-in flywheel magneto, Holley carburetor, Champion spark plugs, double manifold muffler and throttle governor. A two-compartment kerosene and gasoline fuel tank and a cast-iron base are provided.

The construction of the five h. p. engine is similar to that of the smaller one described. It weighs 145 pounds. The bore is 3 inches and the stroke 3½. The flywheel is 17 inches in diameter and has a 2-inch face. The pulley is 4 inches in diameter. The speed is 900 to 1,350 r. p. m. Cooling and other equipment is similar to that of the three h. p. engine

The Aerothrust pumping unit is particularly adapted for use on all kinds of jobs where water is needed or where it must be eliminated. The three h. p. unit delivers 125 gallons per minute at a total head of 30 feet. The outfit weighs only 160 pounds. It consists of the Aerothrust engine direct-



SANFORD MOTOR TRUCK.

connected to a 2-inch centrifugal pump mounted on a light but strong base. It can be bolted down to any floor or may be mounted on two skids and easily carried around by two men. As the two cylinders fire at the same time, the engine is vibrationless and does not have to be held down at the job. The five h. p. outfit is of similar arrangement, a 3-inch centrifugal pump being used. The unit weighs only 250 pounds and is built to deliver 250 gallons per minute at a total head of 30 feet.

The accompanying ilustrations show a three h. p. engine and one of the five h. p. pumping outfits The machines are made by the Aerothrust Engine Company, La Porte, Ind.

INDUSTRIAL NEWS

Cast Iron Pipe.—The considerable drop in iron pipe prices of $15 per ton on all sizes has been the result of the recent price regulation of iron ore, pig and finished products. Since the Federal regulations are effective until Jan. 1, 1918, no further decrease is expected until then. It is expected that cities will begin asking for bids for future needs. Quotations: Chicago, 4-inch, class B and heavier, $53.50; 6-inch, $50.50. New York, 4-inch, class B and heavier, $53.50; 6-inch, $50.50. Birmingham, 4-inch, class B and heavier, $48; 6-inch, $45; class A, $1 extra.

Clay Products Association.

This association has recently been formed as an outgrowth of the International Clay Products Bureau, with the following officers: L. G. Blackmer, of Blackmer & Post Pipe Co., President; E. S. Hoyt, Red Wing Sewer Pipe Co., Vice-President; J. L. Scott, Macomb Sewer Pipe Works, Treasurer; George H. Tefft, Secretary and Manager; the headquarters will be at 912 Chamber of Commerce Bldg., Chicago, Ill.

Membership is limited to manufacturers of clay products in the United States and Canada, particularly vitrified salt glazed sanitary sewer pipe, segment sewer blocks, drain tile, vitrified wall coping and flue lining.

The association purposes to devise ways and means for promoting and extending the use of vitrified sewer pipe, segment blocks and other products manufactured by its members and for maintaining high standards in their manufacture. It will maintain complete testing, chemical and analytical laboratories and will be better able to co-operate with the American Society for Testing Materials than was the International Clay Products Bureau, the membership of which in that society will be continued by the new association. The association will also co-operate with the U. S. Public Health Service and with state and local boards of health for improving sanitary conditions. Also with fire prevention societies and the National Board of Fire Underwriters, with a view to bringing about better construction of buildings, especially chimneys, by the use of fire clay flue lining. It has offered to the U. S. Government the service of its engineers to encourage the drainage of wet and superirrigated lands. It will cooperate with the traffic bureaus of railroads in endeavors to improve methods of loading, unloading and transporting clay products and securing freight rates that are just and equitable to railroads, manufacturers, and consumers. It also will carry on an active and vigorous campaign in conjunction with good roads periodicals for the better drainage of wagon roads and the construction of hard surfaced wagon roads.

About thirty of the principal manufacturers are charter members of the association and it is expected that within a few months all of the manufacturers of the materials named above will join the association and assist in a publicity and a promotion campaign that will include not only engineers and dealers, but also consumers. Its endeavor will be to create good will for the future as well as for the present.

The Asbestos Protected Metal Company, Pittsburgh, Pa., announces the appointment of Ole K. Olsen, 822 Perdido Street, New Orleans, as sales agent for the state of Louisiana and the southern portion of Mississippi.

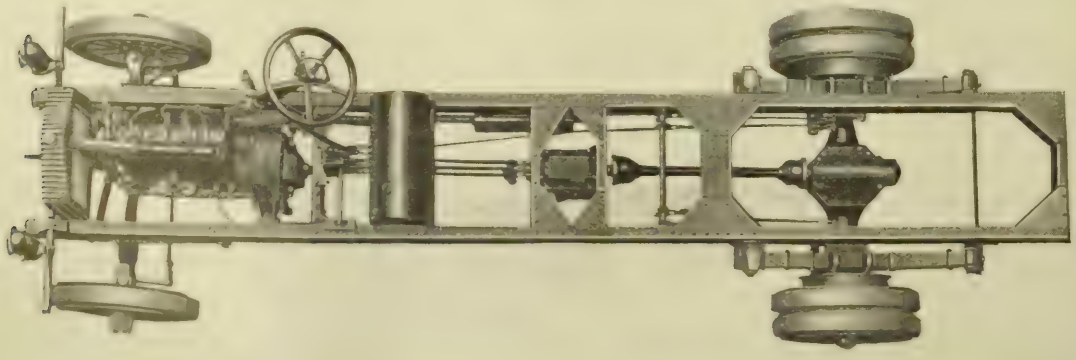
The Macleod Company, 2232-2236 Bogen Street, Cincinnati, Ohio, in order to take care of its rapidly expanding business, has been compelled to enlarge its plant and to increase its capital to $100,000. The company has been established for over twenty years and its trade has extended to a great many industries of the United States and foreign countries. The chief products made by the company have been sand blast equipment and metallurgical furnaces.

The American-La France Fire Engine Co., Inc., Elmira, N. Y., announces the receipt of the following orders: Butte, Mont., 1 type 40 chemical engine—Cherokee, Iowa, 1 type 40 combination with Juuior pump—Fergus Falls, Minn., 1 type 75 combination with Junior pump—Gloversville, N. Y., 1 type 40 combination with Junior pump—Lebanon, Tenn., 1 type 40 pumping engine—Long Branch, N. J., 1 type 75 chemical with Junior pump—Martin's Ferry, Ohio, 1 type 31 55 ft. serial truck—Monticello, Cal., 1 type 75 combination with Junior pump—Pottstown, Pa., 1 type 17 tractor—Reading, Pa., 1 type 75 pumping engine—Tyrone, Pa., 1 type 14 service truck—Vin Del Mar, Chile, 1 type 40 combination with Junior pump—West Hoboken, N. J., 1 type 31 truck tractor—Winters, Cal., 1 special pump engine—York, Pa., 2 type 12 pumping engines—East Las Vegas, N. M., 1 Brockway type B combination; Elwood, Ind., 1 Brockaway hose car—Glenwood Springs, Colo., 1 Brockway type B combination—Lancaster, N. Y., 1 Brockway type B combination—Lincoln, Ill., 1 Brockway type B combination—Middleton, Pa., 1 Brockway type B combination—Port Huron, Mich., 1 Brockway type B combination—Reading, Pa., 1 Brockway type B combination—Toms River, N. J.,Brockway type B hose car.

Standardization of U. S. Army Truck.

The Secretary of War has made the following statement: "The designing of the new standard military truck, which must meet the field transportation problem of modern warfare, has been completed. A sample chassis, representing the efforts of approximately two score truck specialists, will be ready by the middle of October, and final tests will be conducted. Deliveries are expected to begin in January, within four months after the War Department undertook the development of the truck.

After a series of conferences between



TOP VIEW OF SANFORD TRUCK CHASSIS.

military and civilian engineers the design of the standard truck was completed early in September. Within 10 days detailed drawings were made and sample parts ordered. Ordinarily it requires several months to perfect and turn out such parts, but various manufacturers patriotically agreed to put ahead the Government's work, and delivery of the parts, it is now expected, will be made by October 1. The crankshaft die was sunk in seven days, and the crankcase pattern and first casting were made five days after receipt of the drawings.

It is believed the new standard motor truck will fully meet the requirements of the Army in the field. Rapidity of manufacture, stability, and standardization are the outstanding promises of the new truck.

In July the Quartermaster Corps initiated the movement for the production of a standardized military truck that would be an improvement over commercial designs heretofore used. Cooperation of truck manufacturers in all parts of the country was promised at a meeting held in Columbus in July. Early in August about 50 truck specialists and engineers of established reputation came to Washington at the invitation of the Quartermaster Corps. The Society of Automotive Engineers, which is assisting the Government on engineering problems, also sponsored the Washington conferences.

Both manufacturers and engineers generously contributed trade secrets in the designing of the military truck, just as they did in the development of the aviation engine. Engineers believe the new truck, a composite of the best there is in all commercial trucks, will be several years in advance of anything yet produced. Manufacture of the new truck will be carried on under direction of the Quartermaster Corps and the automotive committee of the Council of National Defense. Mr. Christian Girl, who has resigned as president of the Standard Parts Co. to undertake the work, has been selected by Col. Chauncey Baker directly to supervise the work of production.

The new military truck will be made in two models, class A and class B. The engine used in the two will be the same in design, except for slight differences in cylinder bore, pistons, piston parts, and riggings. To a large degree interchangeability of parts will be possible. The class A model will have a normal carrying capacity, under the arbitrary official ruling, of 1½ tons, with an actual commercial capacity of 3 tons. The class B truck will have a normal capacity of 3 tons and an actual capacity of 5 tons. Both trucks will have a two-wheel drive, with a speed requirement of 14 miles per hour for the class A trucks and 12 miles for class B trucks.

It is planned that the first orders for the trucks shall call for 10,000 vehicles, to be delivered in the first six months of 1918. These orders will call for 10,000 class B and 5,000 class A trucks. The adaptability of the new trucks to commercial as well as military uses is indicated by arrangements now being made by a number of manufacturers to produce them for commercial purposes.

NEWS OF THE SOCIETIES

(Continued from page 369.)

One of the reports of most interest given during the first day of the convention was made by W. B. Sands, of Chinook, whose subject was "Taxation and Assessment." Briefly summed up, Mr. Sands said he wanted the mines to pay a tax on profits instead of valuation.

At the second day's morning session papers were read and discussions heard concerning street paving. There was considerable time devoted to debate on the storm sewer question, L. B. Evensen, of Great Falls, leading. Mr. Evensen was asked many pertinent questions relating to the operation of storm sewers in Great Falls.

Taking up the question proper of street paving, A. C. Birkland, of Lewistown, talked briefly concerning this issue. He condemned the prevalent practice of cities permitting contractors to virtually draw up their own bonds. Mr. Birkland suggested that the league select two or three lawyers versed in municipal laws to meet with the Montana Engineers' Association at the next session of that body to help devise ways and means to attain the objects he outlined. He urged, also, the cooperation of all city attorneys in the matter of this standardization. Mr. Birkland presented a form of this sort, now in vogue in Lewistown, and suggested that it might contain some hints that would be helpful to all concerned.

E. M. Sneckenberger followed, dwelling at length upon the matter of maintenance of pavement and measures relating to payment therefor. He discussed the various methods employed in making assessments, and recommended more flexibility along these lines.

L. B. Evensen submitted a lengthy paper on the paving subject, dealing with the various types of surfacing, street width, drainage, pitch to be used in various section of all cities, and the proportions to be used in mixing to arrive at a perfect pavement. He said, in part:

"The purpose of this paper is to deal with pavements laid in this city and to show the advantages and disadvantages of each kind under its particular service, to show the necessity of design and foresight in the construction of a modern city. A perfect pavement has not as yet been constructed, although if everything were true that is said about pavements by some promoters there would be no reason for reconstruction in after years nor any need of constant study of conditions to bring about better results in paving. The engineer must be able to select with reasonable foresight the kind of pavement best suited for the location in which it is to be placed. No engineer, no matter what experience he has had, is a prophet, even if some people think he ought to be, nor should he be condemned if he make a few miscalculations when he is continually hampered by lack of funds with which to carry on improvements.

"For convenience the subject under consideration can be divided into the following heads:

"1—Pavement for residence street.

"2—Pavement for residence street with street railway.

"3—Pavement for business property.

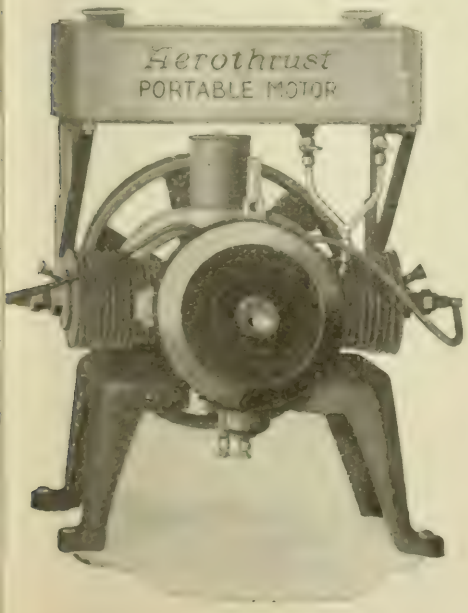
"4—Pavement for business property with street railway.

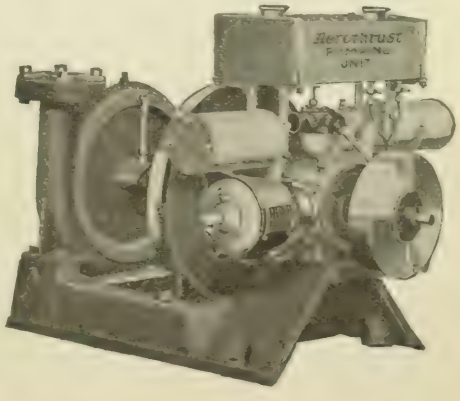
"5—Pavement for wholesale district.

"6—Alley paving.

"7—Strips leading into the city."

In his address following Mr. Mitchell's talk on city planning, R. E. Mc-





3-H.P. AEROTHRUST PORTABLE ENGINE AND 5-H.P. AEROTHRUST PORTABLE ENGINE, DIRECT-CONNECTED TO CENTRIFUGAL PUMP.

Donnell of Kansas City said the saddest word on the city planning subject was "too late." He told of an expenditure of $600,000 required to be made by the municipality of Kansas City for the widening of one street two blocks. He urged Montana towns to start now planning for the future. He told the leaguers that the best thing Kansas City had ever done in the way of civic improvements was the expending of $16,000,000 in the past twenty years on public parks. Mr. McDonnell averred that the installation of these parks had enhanced property twofold. He also announced that Kansas City had adopted a plan of wider radia in the business district, thus providing more room in which to turn traffic.

E. C. Horsky of Helena, following along the lines of city planning, urged the league to do its best to bring about improved finance conditions for cities. He condemned the present drift, which forces more of the building and occupation of tenements and apartments, to the detriment of the home with the yard and garden. He attributed this, however, to excessive taxation, declaring that this made building too expensive for the average man, who found it cheaper to live in a rented place or a tenement.

Robert Pauline, mayor of Kalispell, submitted a paper dealing with the question of paving. Mr. Pauline was unable to attend the meeting, and the report was read by the clerk. The statement dealt with types of paving, surfacing, subgrades, etc.

The afternoon meeting of the league was devoted entirely to discussions of municipal questions, reports and the annual selection of officers and an annual gathering place. The election was made the first duty of the body, and at the conclusion of the business session a convention place was selected, Helena being chosen on account of legislative assembly being in session at that time.

In addition to choosing a meeting place the association selected officers for the ensuing year. Those who will serve in official capacities are: N. A. Ward, Butte, president; W. M. Johnson, Billings, first vice-president; H. W. Brown, Cascade, second vice-president; W. H. Harrison, Great Falls, third vice-president. H. L. Fitton, of Lewistown, was renamed secretary-treasurer of the league. Mr. Fitton served in this capacity last year

The question of remuneration for the secretary-treasurer was discussed and a decision was reached to pay that official the sum of $100 annually for his services

Edward Horsky led a discussion on municipal ownership of municipal utility plants. This subject proved of interest to all those gathered, and many participated in the debate. All were in favor of cities owning their own utilities and operating the same, except for one or two isolated instances, where it was suggested that small towns like Belt and Cascade might not be able to conduct all their enterprises, such as lighting systems, for themselves. H. W. Brown, Frank Ploutnik, Dominic Spogen and W. M. Johnson participated in the discussion.

C. C. Widener of Bozeman led the debate concerning waterworks and was helped along by R. E. McDonnell of Kansas City, W. H. Lawrence of Kalispell, A. L. Badeon of Dillon, and others.

Dominic Spogen of Belt spoke briefly on the question of public parks, and told his hearers that the town of Belt had bought and paid for a 24-acre tract of natural woodland, which was used as its municipal playground and park.

The main feature of the evening was a lecture upon water and filtration plants, their construction, operation and benefits, by R. E. McDonnell of Kansas City. Mr. McDonnell, who designed the Great Falls filtration plant, illustrated his talk by stereopticon views, showing the Great Falls plant as well as those at St. Louis, Billings, Miles City, Oklahoma City and other points. He also threw upon the screen charts showing the great reduction in deaths and cases of typhoid fever in the various cities following the installation of filtration plants. He advocated the adoption of the meter system of water sales.

MUNICIPAL INDEX

(*Continued from page* 368.)

Sand and Gravel Digger Designed and Built for Ohio River. Machine to raise concrete aggregate from stream bed for use in locks and dams. Equipment produces 800 cu. yds. in 8-hour day. By A. W. Kreamer, Jr., Engr. 4 ills. 2,200 words. Engineering News-Record Sept. 13. 15 cts.

Contracting from an Engineering Perspective. By H. W. Hatton. 1,700 words. Cement Era. Sept. 20 cts.

Building Up an Engineering Organization. The qualities that a man must have to fill a particular job. Discovering these qualifications. By A. E. Morgan, Chf. Engr., Miami Conservancy District. 1,250 words. Engineering News-Record. Sept. 20. 15 cts.

A Method of Determining the Apparent Specific Gravity of Fine Aggregate. 700 words. Engineering & Contracting. Sept. 5. 10 cts.

Economical Proportions for Portland Cement Mortars and Concretes. From a paper by J. A. Kitts. 3,000 words. Engineering & Contracting. Sept. 5. 10 cts. 4 ills.

Contracting on a Modern Basis. How concrete construction must be carried on under modern ideas of management. 1,000 words. The Cement Era. Sept. 20 cts.

How the Progress of a Big Construction Job was Scheduled. Description of progress chart used on a recent job by the Aberthaw Construction Co. 1 ill. 1,100 words. Cement Era. Sept. 20 cts.

Concreting Plant has Novel Way of Handling Cement. Delivered from shed to mixer by gravity tramway. By W. S. Tait. 1 ill. 1,000 words. Engineering News-Record. Sept. 6. 15 cts

Design and Construction Features of New Buildings of South Park Commissioners of Chicago 4 ills. 1,100 words. Engineering & Contracting. Sept. 26. 10 cts.

No Promise of Lucrative Practice Made to Engineering Students. Engineering schools, in reply to questionaire, report marked demand for young graduates in all branches and some general increase in pay. 4,000 words. Engineering News-Record. Sept. 13. 15 cts.

Railway Practice in Steam Shovel Operation. Report of the American Railway Engineering Assn. on steam shovel operation. 1,500 words. Engineering & Contracting. Sept. 19. 10 cts.

What is the Trouble with Concrete in Sea Water? The first of a series of articles on the deterioration of concrete in sea water. By Rudolph J. Wig and L. R. Ferguson. 3 ills. 2,500 words. Engineering News-Record. Sept. 20. 15 cts.

Handling and Measuring Bulk Cement. Is not dusty to handle and may be loaded direct from car to mixers or by dump wagons, dump-body trucks or industrial railways. 1,100 words. Cement Era. Sept. 20 cts.

Citizens' Street Traffic Committee of Greater New York.

At a meeting of the executive committee, held Sept. 26, the date for the annual meeting was set for Oct. 10 at 7 p. m., at the Automobile Club of America. The committee recommended a change in the name of the organization to "The Street Traffic Association of New York State."

League of Iowa Municipalities.

The twentieth annual convention of the League of Iowa Municipalities was held at Iowa City, Sept. 19-21. At the final morning session the city of Ames was selected as the meeting place for the next annual convention and the following officers were elected to serve for the coming year: president, T. A. Potter, of Mason City; vice-presidents, W. R. Law, Waterloo; W. B. Snyder, of Council Bluffs, J. F. Ford, of Fort Dodge, and H. K. Stebbins, of Iowa City.

The first afternoon session was combined with the sessions of the health officers' short course of lectures being put on by the Iowa university. Dean D. O. McGovney, of the college of law, gave a very able address on the legal aspects of health administration. This lecture was designed to assist health officers to understand their duties and powers under the law and to know what co-operation to expect and demand from other officers.

President W. A. Bierring, of the state board of health, gave an address touching upon the relations of the state board of health to the local boards of health. This address, too, was designed for the benefit of the local health officers in order that they may better understand their powers and duties.

M. G. Lloyd, of the federal bureau of standards, Washington, D. C., gave a short address on the relations of the bureau of standards to the municipality.

The second day of the short course for Iowa health officers began Thursday morning with a paper by Dr. G. R. Roudiger, health commissioner of LaSalle, Ill. An address by Dr. D. B. Armstrong, director of tuberculosis control demonstration of Farmington, Mass., occupied the second part of the program. Dr. A. W. Freeman also spoke before the assembly on the control of poliomyelitis.

In the afternoon Dr. Steindler, professor of surgery of the college of medicine, concluded a clinic in the study of "Orthopedic Relief of Poliomyelitis," in the surgical amphitheater of the university hospital. Dr. Freeman conducted a meeting later on "The Sanitation of Iowa Villages and Farms."

Municipal Journal

Volume XLIII. NEW YORK, OCTOBER 18, 1917 No. 16

SPEEDING UP CONCRETE ROAD JOB BY BONUS SYSTEM

Contractor Increases by Fifty Per Cent the Amount of Work Done by His Equipment Without Enlarging Gang—Bonus to Every Man for Each Section in Excess of a Daily Minimum.

CONCRETING GANG AT WORK.
Twenty-six of the thirty-two men in the gang can be seen, the others being behind the camera.

Good treatment of the men and a bonus system of payment for all work over a specified amount done per day has yielded big results on the construction of a concrete road in Westchester County, N. Y. The amount of concrete laid per day has been increased nearly 50 per cent with only a small increase in the number of men and with the same equipment.

Good management is much in evidence on this job. By fair treatment of the men and by the bonus system mentioned above, delays due to shortage of men and the trouble incident to hiring and breaking in a large percentage of new men every week have been eliminated. Wherever possible, however, labor saving machinery has been installed and the number of men reduced. By arranging for concrete materials to be delivered without dependence on railways, a fruitful source of delay and trouble due to non-delivery of materials has been avoided. Sand, cement, and stone and gravel are shipped in barges up or down the Hudson to Tarrytown, whence they are delivered by motor truck to the job six or seven miles away.

The road being constructed is known as Repair Contract 1102 of the New York State Highway Department. The work consists of laying a concrete surface on 7.22 miles of old waterbound macadam, which had been given several bituminous surface treatments. The concrete surface is 16 ft. wide, 4¾ inches thick on the edges and 6¾ inches in the center, giving the vertical section of the pavement an area of 8.11 sq. ft. The concrete is mixed 1:1½:3, which is now the standard of the New York State Highway Department for first class roads. The contract price, which includes removing the top part of the old road in preparation for placing the concrete and making one small cut, is about $116,000. Although the contractor has until August, 1918, to complete the work, it will probably be finished this fall, as it is already nearly 70 per cent completed.

During the first part of the work, 24 men were assigned to the mixing gang. This gang averaged 400 ft. of finished road a day. In an effort to increase the amount laid daily, the number of men attached to the mixer was increased to 32, not including the foreman. This speeded up the work somewhat but did not give entire satisfaction. After a conference between the concrete foreman, Bruce Decker, and the contractor, Frank L. Cohen, of Buffalo, the two evolved the bonus system which has since been so successful. Estimating that about 500 ft. should be laid with this gang daily, Mr. Cohen announced that he would pay each man in the mixing gang, 32 in all, a bonus of 25 cents for every 30-ft. section over 510 ft. constructed in a regular 9-hour day. From an average of not much more than 400 ft. laid per day, the daily re-

ports showed at once a jump of about 50 per cent. Since this bonus system has been in force the daily average has been slightly over 600 ft. Several times the amount has run over 700 ft. and on October 4th 750 ft. were laid, setting a record and netting each man in the mixing gang a bonus of $2 over and above his wages.

In ordinary work, where the incentive to hurry is not present, a mixing gang the size of that employed on this job would be unwieldy and the men would get in each other's way. Under the bonus system no man wants to shirk or dares to if he should so desire, for each man sees that every other is busy, as increased pay comes only from extra effort on the part of all. The make-up of the mixing gang is as follows: One engineer; 1 fireman; 2 finishers; 2 men on the forms; 3 men handling cement; 3 men placing concrete; 5 men wheeling and shoveling sand (each man fills his own barrow); 10 men wheeling stone, and 5 extra stone shovelers. In addition there is the foreman.

Every effort is made to handle materials without waste of time or effort and wherever possible materials are so arranged that they can be reached with least trouble and confusion. Sand and stone or gravel (both are used) are dumped in alternate piles on the subgrade, leaving enough room on one side so that a team or motor truck can come up with extra materials if there should be a shortage. Cement bags are tied in bundles and thrown in the field along the road, whence they are picked up by a light motor truck which the contractor maintains for utility work. Cement is distributed in neat piles along the road. When the mixer is running (and this is practically all the time with the bonus system in operation), two men open the cement bags and stand them in a double row along one side of the road close to the form. Here they are out of the way and the cement feeder on the mixer has nothing to do but reach for the bags and empty them into the scoop. In wheeling sand and stone, the loaded barrows take one side of the road and the empties the other side. A Koehring No. 16 mixer is used and this is charged with 3 bags of cement, 2 barrows of sand and 4 barrows of stone or gravel, each barrow being loaded to hold about 2⅛ cu. ft. (theoretically 2.14). This makes a 1:1½:3 mix.

The road section is parabolic. Kahn expansion joints are placed at 30 ft. intervals. Five-inch channels are used for forms and these are held in place by iron pins driven into the ground through perforated ears attached to the forms. About 1,600 ft. of forms are in use. Lately the steel forms have begun to show signs of hard usage and, since the steel forms are hard to get, they are now being replaced with wooden forms made of 2 x 6 timbers planed down to the proper size. These are held in place in the same manner that the steel forms are and in addition an iron spike connecting each timber with the adjacent one insures a smooth joint. All forms are in 10-ft. sections.

STEAM-OPERATED SCARIFIER ATTACHED TO ROAD ROLLER.

After the concrete is placed it is brought to the proper section with a strike board cut to the proper section and the surface is then floated, using long-handled wooden floats at first and finishing from a bridge. For working around the expansion joints, a split float is provided. Before the final set takes place the surface is broomed, and finally is covered with earth and kept moist to protect it while curing.

In preparing the road for the concrete surface, the old macadam and the bituminous mat are scarified by means of a Buffalo Pitts roller with spiked wheels equipped with a steam-operated scarifier attached to the roller. Following this, the road is brought to rough grade with an Austin-Western "Giant" scraping grader, which also is drawn by a steam roller. With this machine the contractor is able, except in places where large stone has been used in the foundation course, to bring the sub-grading very close to true shape and to reduce hand work to a minimum. All of the excavated material will be used for shoulders. In only one place is there any change in grade and this involves only a small amount of easy excavation to straighten a curve. Here the earth is loosened with a rooter plow and the material loaded by hand into wagons.

The grading, however, is light and this excavating is done by the regular light-grading gang of eight or ten men which follows the grader to bring the subgrade section to proper line and grade. Where the old road is made up of larger stones, more work is necessary, as here the grader cannot work so effectively. In this case the grading gang is increased.

STRIKING OFF PAVEMENT AT CURVE.

Water for the concrete work and for the machinery has been secured, except for a short length of road, from the supply systems of Briarcliff Manor and, as the work progressed, Tarrytown. These systems furnished water under sufficient pressure so that no pumps were needed. The small distance noted above covered a section of about a mile and one-half midway between the two villages, where the water was pumped from a stream. A two-inch main, plugged every 300 feet, carries water.

The contractor sublet to J. B. Rose & Co. the contract for furnishing all stone or gravel, sand and cement needed, the materials to be delivered on the job as needed in any amount up to 500 yds. a day. As stated before, the method of handling made the contractor independent of railway delays, delivery being made by barges and motor trucks. The haul from Tarrytown, the delivering point on the river, to the work varied from 2 to 6½ miles. From 12 to 18 motor trucks were employed at times, in order to furnish sufficient material to keep the contractor operating at full speed. Included in the fleet

were the following makes of trucks: Mack, Garford, Pierce-Arrow, United, Gramm-Bernstein, and Saurer. Most of these were 5-ton trucks and carried, generally, 4 yds. of material. The trucks averaged 10 trips a day on a 3-mile haul and on the 6½-mile haul made 6 or 7 trips. All the trucks are equipped with self-dumping devices, and at the dock stone and sand are loaded into them from a bin, so that little time is lost in loading and unloading. The road from Tarrytown is in good condition and there has been little delay or trouble from any source. The barges are unloaded by derricks, which store the materials in bins.

The contractor is Frank L. Cohen of Buffalo. J. Bruce Decker is in charge of the concreting work and is largely responsible for the good showing made by that department. W. A. Johnston is superintendent. All other men were hired locally by the contractor. Thomas L. Way

USING LONG-HANDLED WOODEN FLOAT.

is in direct charge of the work for the New York Highway Department under Bertrand H. Wait, division engineer for this section, with office at Poughkeepsie.

TRACKLESS TROLLEY AT BRADFORD, ENGLAND.

Bradford, England, has been operating a municipal trackless trolley since June, 1911, and finds a number of advantages in such system as compared to regular trolley lines. The chief of these is the low capital expenditure, which is only about one-tenth of that required for a system with tracks. Thus it has been possible to supply service to many rural and suburban sections where laying a track would be out of the question. This service is regarded in Bradford as a pioneer, preceding the installment of the regular trolley route and serving as a feeder for such routes. These cars also are used as connecting links between the terminals of existing trolley lines. There are now in Bradford 9½ miles traversed by the trackless service and in 1916 there was a car mileage on such routes of 322,390. Eighteen cars were operated and the total operating cost, including interest and sinking fund charges, was 15.5c per car-mile. The number of passengers carried was 3,402,985. The average fare per mile was 1.3c, fares being rated according to the distance travelled.

Each car seats 29 persons and is run by a motorman and conductor. The current is obtained from overhead trolley wires and the vehicle runs upon the pavement on solid rubber motor truck tires. The cars are said to be less noisy and less odorous than the gasoline-driven motor busses. They cause considerable damage to the roads over which they run and these require regular attention and care, as a smooth pavement is necessary to successful operation. An exact statement of profit and loss seems to be impracticable, since these cars take current from the same feeders that supply it to a regular trolley system, and the relative amounts of current used by the two is not known.

BROOMING FINISHED PAVEMENT.
This is done after pavement has taken slight initial set.

These cars do no freight business or parcel delivery, but on the regular trolley systems of the city a parcel delivery system has been in successful operation for a number of years. An innovation is the operation of a truck which follows the line of the rails, taking current from the trolley wires, and is operated between scheduled times of the ordinary trolley service. This truck is fitted with accumulators which take their supply of current from the overhead wires, by use of which stored current the truck is enabled to leave the trolley route at any point for delivering goods.

RECOVERING IRRIGATION WATER

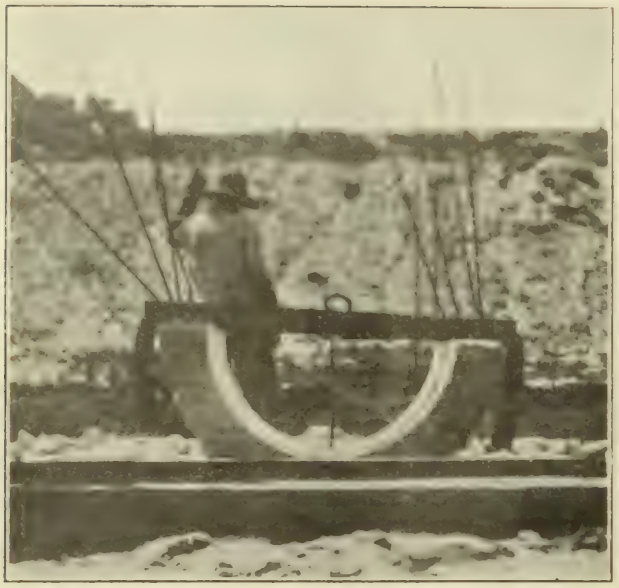
Los Angeles Constructs Long Infiltration Gallery in River Bed—Novel Method of Constructing Reinforced Concrete Conduit and Gallery.

By C. W. GEIGER.

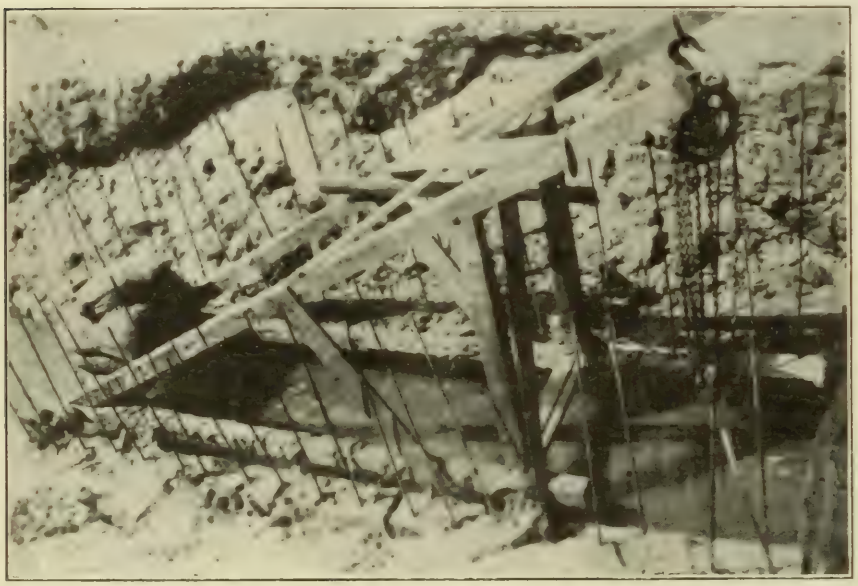
Part of the water which enters the upper end of the Los Angeles aqueduct is used for irrigating lands in the San Fernando valley, and a considerable part of this finds its way ultimately into the Los Angeles river. This river during the summer and fall has only an underground flow, and although the irrigating water considerably increases this, it is not accessible by ordinary methods of drawing from river supplies. For the purpose of recovering this water for further use, a reinforced concrete infiltration gallery is being built in the Los Angeles river. The gallery will be 12 ft. and more under the bed of the river in order to intercept the underground flow, which travels at practically this depth. As the underground flow has been filtered through several miles of sand and gravel, and any surface flow must pass through several feet of similar material lying over the gallery before reaching it, it will probably contain little if any suspended matters. However, up to a point above the packing houses no water will be taken from the river; but from this point up, water will enter the infiltration gallery through the joints, as explained below.

About 8,000 feet of conduit will be laid in the river bed, extending up stream from a pumping station. About 6,000 ft. of the conduit will be tight and 2,000 will have open joints and serve as an infiltration gallery. The water found entering the excavation is being analyzed as the work progresses, and the open joints will not begin until analyses show it to be free from objectionable matters in suspension or solution. An electrically-driven centrifugal pump with a capacity of 6½ million gallons daily will take the water intercepted by the infiltration gallery and force it into the city mains and the Hazard reservoir, to be used by the city.

The combined conduit and gallery is constructed of



CLAMP USED TO LOWER "BISCUITS."



CRANE FOR SETTING INVERT "BISCUITS."
Wheels on which crane rolls rest on top edges of invert already set, and which is running nearly full of water.

reinforced concrete, is elliptical in shape and averages 42 inches in diameter. In constructing it, an invert is cast in sections forming half the perimeter, which sections are locally called "biscuits." Each biscuit contains eight pieces of reinforcing steel, four on each side, the ends of which extend sufficiently to permit their serving as reinforcement for the upper half or arch of the sewer, which arch is poured in the trench. The forms ued in casting the biscuits consist of two pieces of sheet iron for the inner and outer surfaces, and inch boards locked to the form at the two spring lines, each board containing four holes through which the steel reinforcing rods extend. Enough of the biscuits are made at one point to extend a distance of 700 ft., after which the mixer, forms, etc., are moved up 700 ft. and biscuits cast for the next stretch of the same length; it being estimated that this distance is the maximum over which the biscuits can be transported economically. The concrete mixer is operated by an electric motor and receives its current through a cable leading from a main power station located near the end of the conduit.

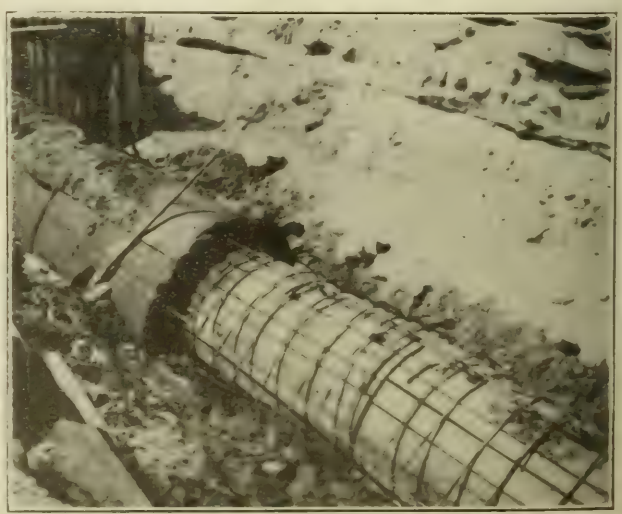
The biscuits are transported from the mixer along the trench by means of a travelling crane mounted on a platform, with double flanged wheels that run on a track paralleling the trench. The biscuits are handled by a clamp shown in one of the accompanying illustrations. This clamp can be locked open, as seen in the photograph, and placed over a biscuit. The crane is then hooked to the clamp, and when the latter is unlocked the two downwardly projecting arms clasp the biscuit, closing somewhat like a pair of ice tongs. After the biscuit has been deposited in the trench, it is set in position by means of a crane carried on wheels that roll on the edges of the biscuits already set. This crane is attached to the biscuit by means of clips that slip over two of the steel reinforcing rods.

The biscuits are made with the contact edges bevelled so that when they are placed in contact there is a V-shaped opening on the inside of each joint. For the first 6000 ft. these joints are made tight by filling them with cement mortar. Wherever the conduit is to act as an infiltration gallery, however, the openings are filled with gravel and small broken stone to permit the water to enter.

In building the arch, inside forms are used consisting of two quarter-segements hinged at the top and supported on the invert already set. When the inside forms have been placed the reinforcing steels are bent to shape and the outside forms put in position, these consisting of two sections, one on each side, which leave an open space about 18 inches wide at the top through which the cement is poured. An electrically-operated concrete mixer travels along the edge of the trench and discharges the concrete through a chute directly into the form.

The mixer is moved along the edge of the trench by means of a cable operated by a drum which is mounted on the platform that carries the crane that transports the biscuits.

This general type of conduit was selected partly at least because practically all other desirable methods of building concrete conduits are patented and the city did not wish to pay royalties.



COMPLETED SEWER IN BACKGROUND; ARCH CENTER AND REINFORCEMENT IN FOREGROUND.

A steam shovel is used to dig the trench for the conduit. Excavation was started at the point where will be located the pumping station for handling the intercepted water. The underground flow of the river, of course, enters the trench, and three pumps operated by electric motors are used to remove this water. One of these pumps throws a 10-inch stream, another an 8-inch stream and a third a 5-inch stream. The sand and gravel removed by the steam shovel in digging the trench are piled up along one side of the trench and will be replaced after the construction is completed. Should it be found that it cannot be completed before the annual rainy season begins, the conduit will be closed and the machinery removed from the river bed, and work will be resumed again after the rainy season is over.

ACTIVATED SLUDGE PROCESS FOR STOCK YARDS

General Description of Plant Proposed for Treating Sewage From Chicago Stockyards District—Estimated Cost of Construction and Operation.

About a year ago Langdon Pearse and W. D. Richardson, representing the Sanitary District of Chicago and the Stock Yards Interests of that city, respectively, began an investigation into the matter of treating the sewage of Packingtown by the activated sludge process. A progress report was made last November and a final report has recently been submitted to the engineering committee of the Sanitary District and the committee representing the stockyards interests.

The amount of sewage to be treated is estimated to total about 50 cu. ft. per second of industrial sewage and 11 cu. ft. of domestic sewage between 8 a. m. and 8 p. m. of an average day, and to average 23 cu. ft. per second of industrial sewage and 7 cu ft. of domestic sewage between 8 p. m. and 8 a. m., these being the figures for 1916; while for 1930 the average day flow is estimated at 58 cu. ft. of industrial sewage and 15 cu. ft. of domestic sewage, and the night flow at 28 cu. ft. of industrial and 9 of domestic sewage.

In the progress report the investigators stated that: "After careful consideration of all the material, we have come to the conclusion that so far as the question of purification of the sewage is concerned, the activated sludge process will handle the sewage originating from Packingtown in a manner which will produce an effluent suitable to discharge into the channel of the Sanitary District."

The authors stated that "No (activated sludge) plant is in operation in the United States, either on domestic sewage or trade waste, in which all these elements are carried out on a continuous working basis. Until a large scale unit has demonstrated the efficiency and practicability of the process, on domestic sewage and particularly on trade wastes, including packinghouse sewage, the process cannot be recommended without qualification as a practical solution of the Stockyards sewage problem." This point of the absence of experience with plants in service is again referred to in the statement: "While there is no large activated sludge plant in continuous operation, completely equipped, on the other hand the test plants and small installations report encouraging results on the purification accomplished. The sludge problem, however, has only been handled on a small scale, or in a manner which does not apply here." "There is practically no available data on the cost of operation of an activated sludge plant of the size recommended herein, even on domestic sewage. The operating figures from plants like Worcester and Providence have been helpful." "In the present state of the activated sludge process, there is no large plant operating to determine operating and recovery costs, nor have any of the smaller plants running ever operated over a long enough period to determine the life and efficiency of the air distributors, and certain other parts of the plant. Up to the present time the pressing and drying of activated sludge has not been worked out to a thoroughly satisfactory conclusion. The only successful experiments of which we have knowledge were conducted at Milwaukee last summer. They were continued for a short period of time only, with one press of a comparatively new design. This press is expensive to install and of limited output." Finally, in their conclusions, they say: "Although no large activated sludge plant is in operation at the present time, either on domestic sewage or trade waste, and although no smaller plant has been operated continuously as a complete unit in such a way as to deliver a purified effluent and also to handle the sludge in a sanitary way by pressing and drying, nevertheless we know of no place where it has been a failure. Consequently, in our judgment, the activated sludge process offers the best promise of a solution of the Stockyards sewage problem of any suggested up to the present time."

In view of this lack of previous experience, the investigators recommend that at the present time one complete unit of the type of sewage treatment plant proposed be installed, to determine definitely the practical success or failure of such type of plant; such unit, including whatever machinery is necessary for its proper operation, to be built and operated in every way as a complete plant in actual service. During the present year Swift & Co. has installed and put into operation an activated sludge plant capable of handling in 24 hours approximately 600,000 gallons of typical concentrated packinghouse sewage, this plant being equipped with full-size filter press for the handling of the sludge, with a view to conducting extensive experiments to determine the best means of sludge concentration and drying. The results obtained by this plant will be availed of by the committee both in building its unit installation and in forming its conclusions as to the most effective details of construction and operation.

In addition to activated sludge tanks, it was considered that devices should be installed to catch grit, retain grease and screen out coarser solids arriving at the plant prior to the activated sludge treatment. The grit chamber would be such as to produce a minimum velocity of 1 ft. per second, part of it serving also as a tank from which to skim the grease from the surface of the sewage. Coarse bar screens with a clear opening of about 1 inch would be followed by fine screens with meshes or slots of one-twentieth to one-thirtieth of an inch in diameter. If there is pumping, these screens should be set ahead of the pumps.

It is estimated that the amount of grease collected would be more than 1,000 lbs. per day, and more than 3,600 lbs. of ether-soluble material, based on an average flow of approximately 50,000,000 gallons for 24 hours.

THE PLANT PROPOSED.

In accordance with results obtained at the testing station conducted by the Sanitary District, the design for a plant to produce complete stability in warm weather was based upon the following assumptions:

1—The aeration of the screened sewage in continuous-flow tanks using 4 cu. ft. of air per gallon of sewage, with an 8-hour contact period of sewage and activated sludge.

2—Sufficient sludge storage capacity in the aeration

tanks to care for 140 per cent of the sewage entering the tanks. Approximately 40 per cent of the incoming flow is returned from the settling tanks, as a mixture of sludge and sewage.

3—The depth of the tanks has been fixed at 16.5 ft. over the plates. The air distribution proposed is through filtros plates set in unit boxes of cast iron. The ratio of the area of filtros plates to the superficial area of the tank is about 1:6; 1,080 sq. ft. of plate area is provided for each unit, of 1.5 million gallons daily, or 720 sq. ft. per million gallons daily.

The complete design suggested includes 32 activated sludge units, but, as stated above, it is recommended that only one be built at present, to be operated for a few months as an experimental plant. Each unit is 38 ft. 4 inches wide by 160 ft. long, with 16.5 ft. of water depth over the plates. The tank is divided by wooden baffles into 3 longitudinal channels in series. A covered pipe gallery is planned between the batteries of tanks, in which air and sewage mains can be carried. Individual air and sewage meters are included in each unit, in addition to the two large meters which handle the entire flow of air and sewage.

After thorough agitation in the aeration tanks, the liquid will pass to settling tanks of the circular Dortmund type, 30 ft. internal diameter and with a water depth of 33.5 ft., and with hopper bottoms having a slope of about 60 degrees with the horizontal. A settling period of about 1 hour is proposed.

In order to prevent clogging of the filtros plates with oil, soot, dust, etc., air washers are provided ahead of the compressors. The estimates were based on the use of electrically driven centrifugal compressors of the type made by the De Laval Steam Turbine Co. or the General Electric Co. The power required to provide 20,000 cu. ft. of free air per minute under a pressure of 6 lbs. per square foot is 700 h.p., and 1100 h.p. for a pressure of 10 lbs.

"At the present time filtros plates offer the most satisfactory air distribution. Although the cost of maintenance may be somewhat higher than perforated pipe grids, we believe the distribution is better and size of air bubbles is much smaller, with consequent increase in efficiency. The basswood plates now being tested in Milwaukee produce a remarkably fine air bubble, insuring a considerable reduction in the use of air. The life of basswood plates is at present very uncertain, because of possible decay."

While the activated sludge process is peculiarly successful in producing a clear effluent of desired stability, it also produces an enormous volume of very liquid sludge, which must be handled while comparatively fresh. Treatments suggested include concentration or re-aeration followed by separate sludge digestion, lagooning, air drying, and filter pressing. The experience of the Sanitary District is similar to that at Cleveland, indicating that normal activated sludge will not dry as quickly or as readily as Imhoff tank sludge. This appears to be an inherent difficulty in colloidal sludge. When applied to a sand bed, part of the sludge sinks, part floats, and the water separating out is between. The only method for recovering the material of value that has been demonstrated is by filter pressing and heat drying. Possibly the yeast fermentation method developed at Dublin may offer a suitable alternative for filter pressing, but so far it has not been tested on activated sludge. Experiments of the Sanitary District indicate that the sludge can be concentrated 50 per cent in volume with 2 or 3 hours quiescent settling, the depth of settling tank seeming to have practically no influence on the moisture content of the concentrated sludge.

The cost of pressing sludge is estimated as follows, this estimate being based upon 96 tons per day of dry material:

75 lin. yd. No. 8 duck, 120-in. wide	$132.00
Repairing and renewing racks	10.00
Oil, waste and miscellaneous	13.00
Labor	109.00
Power, 311 h.p.=232 kwh. at 0.7c per hour for 24 hrs.	39.10
Interest and depreciation*	246.29

Drying the same amount of sludge is estimated to cost as follows:

Coal at $1.75 per ton	$64.75
Repairs and renewals	29.00
Other supplies	1.25
Labor ($2.40 per day)	32.40
Power, 157 kwh	26.40
Interest and depreciation*	81.19

This gives the total for drying of $234.99; and the average cost per ton for pressing was therefore $5.72 and that of drying, $2.45. The sludge cakes produced by the filter press are assumed to have 75 per cent moisture, and to be dried to a moisture content of 10 per cent. The estimates are based on direct heat dryers of the Ruggles-Coles type.

The cost of constructing the plant was estimated at $3,489,800, some of the more important items being $778,140 for 32 units of aeration tanks, $122,090 for 32 units of settling tanks, $30,880 for 8 units of sludge tanks, $13,000 for one skimming basin, $160,920 for air piping, $46,700 for sewage piping, $25,700 for sludge piping, $57,050 for drainage piping, $5,000 for water and flushing pipes, $564,080 for compressors, mechanical equipment, house, etc., $784,340 for sludge press and drying house, and $120,260 for screen and pump house. $278,000 of the total was for an intercepting sewer, grading grounds and river front work which were not essential parts of the treatment plant.

For operating, it was believed that two laborers working during the daytime should be able to attend to the grease skimming and that the grit chamber can be cleaned on Sundays, when the help of an extra man might be required. For operating the aeration tanks three shifts are provided, working in 8-hour watches, each consisting of a foreman and 3 laborers, with 2 extra laborers in the day hours. One laborer for each watch is provided for the sludge concentration tanks. For the sludge pressing, for each watch, a crew of one foreman, 3 operators and 3 helpers to handle the press operation, 6 laborers to move pans of press cake, help clean presses, etc., and 1 extra laborer. In addition, 2 seamstresses are provided to make filter bags. In the drying room 3 laborers in each watch are provided to handle the driers, coal, and drier feed; also 2 laborers for handling coal and ashes at the drier plant. For the air compressor plant there is alloted an engineer in charge, with 2 oilers in each watch. For the heating plant a fireman is provided for each watch, though it is probable that the waste heat from the dryers can be utilized for heating the buildings in winter. For the general up-keep of the plant there is provided a steam fitter and helper, machinist and electrician, and for general labor or emergency work in the plant at large, 3 laborers. In addition, there is provided a superintendent, who should be a trained chemical or sanitary engineer, with one assistant in each watch. Also, for the laboratory, a chemist, assistant chemist and helper. This makes a total of 98 employees connected with the plant.

Concerning the returns available by the sale of material, the authors of the report believe that a conservative estimate would be $12 per ton for the dried sludge, and that grease can be reclaimed for ¼c. per lb. and

*Interest is taken at 5 per cent, and depreciation at 5 per cent on boilers, motors, pumps and all machinery, at 4 per cent on water pipe, buildings and concrete structures, 7 per cent on air piping, conveyors and dryers, and 20 per cent on filtros plates.

net 4c. per lb., yielding a return of 1/15th as great as the sludge. If there were 100 tons of dry sludge per day, this would give an annual return of $310,000. At present prices for nitrogenous fertilizers, the dry sludge might bring as high as $18 per ton, and the returns from 100 tons per day would then be $462,000 a year.

The summary of the estimated annual cost shows this to total $455,700 for operating (of which $270,000 is for power), $178,670 for depreciation, and $187,577 for interest; a total of $821,947 for a plant having a capacity of 50 million gallons daily and producing 96 tons of dry material. Deducting the maximum estimated return leaves the annual cost about $360,000 a year, or $20 per million gallons treated. If the lower returns from sale of sludge be used in estimating, the net cost becomes about $540,000 per year or $30 per million gallons.

Mr. Pearse recommended for the initial installation a fine-mesh screen, grit chamber and grease skimming basin to handle the entire flow of sewage; also screw pumps, motor driven, to pump the sewage and deliver screened sewage to the unit plant; and that this should comprise one unit each of aeration tank, settling chamber, sludge concentration tank, filter press and appurtenances. Mr. Richardson agrees with this except that he would omit the grit chamber and grease skimming basin, and would substitute a centrifugal pump for the screw pump.

DROP MANHOLES FOR SEWERS

Conditions for Which Required—Characteristics Desirable—Open, Recess, Pipe, and Channel Drops —Cascade and Ramp Drops.

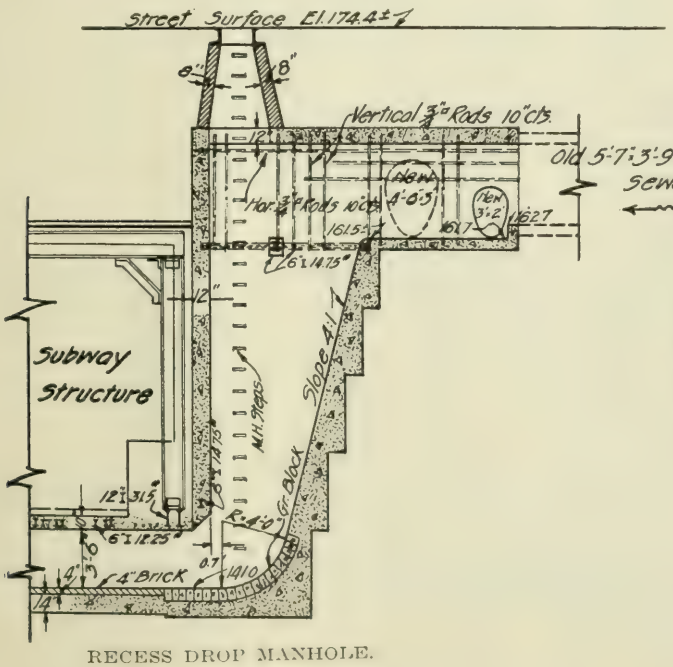
In a paper before the Municipal Engineers of the City of New York, Irwin W. Whittemore, assistant engineer of the Public Service Commission, described the several types of drop manholes used in New York City in the reconstruction of sections of the sewerage system necessitated by the construction of the subways; in connection therewith discussing briefly the advantages and disadvantages of the several types. A brief abstract of the paper is given below.

Drop manholes are generally used to meet one of two conditions: The surface of a street may be so steep that to build a sewer parallel to it would cause a velocity of sewage which would result in erosion and abrasion of the sewer invert, which may be avoided by using flatter grades connected by drop manholes. The other condition is the interference of other underground structures with the continuous grade of the sewer, requiring it to be carried under such structures either by an inverted siphon, or by a drop manhole at the up-grade of such structure and a sewer with flattened grade carried from the bottom of such manhole underneath the structure. A third condition occasionally exists, where a main or intercepting sewer is carried at considerable depth, sometimes in a tunnel, in which case the tributary sewers, which are at a much higher elevation, are connected with it by drop manholes.

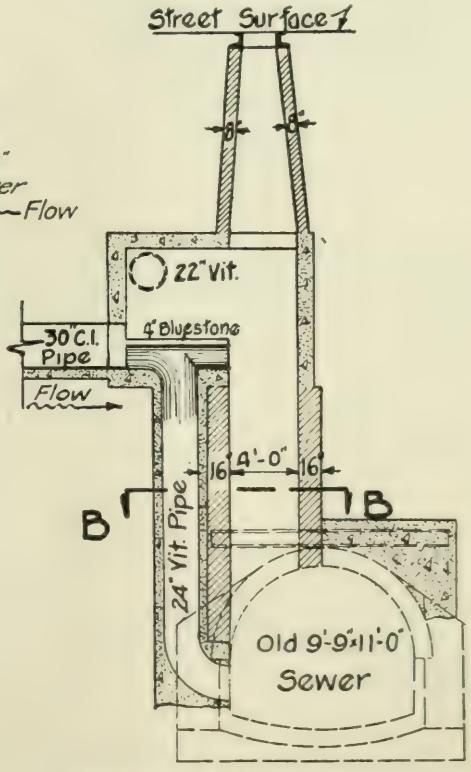
In addition to the cost of such manholes an objection to their use exists where the sewage is to be treated by screening, since the churning up of the sewage which occurs in drop manholes results in a mechanical disintegration of the solids and thus considerably reduces the percentage of suspended solids that can be removed by screening.

Where a drop manhole is to be used, it should as far as possible possess the following characteristics: Accessibility for examination and cleaning; protection of the interior of the manhole from excessive erosion; and the reduction to a minimum of any deleterious effects on the sewage which may make it unsuitable for the method of disposal which is in use.

The first object of the design should be to obtain a manhole which will afford convenient access to all sewers radiating therefrom. This requires that a man be able to enter the manhole and examine and clean the sewer during dry weather without coming in contact with the flowing sewage. To accomplish this purpose, vertical pipes are sometimes provided in which the dry-weather flow is confined while it is passing from the upper to the lower sewer. In other cases a vertical recess is provided of a sufficient depth so that the falling stream does not encroach upon the manhole shaft proper. In special cases it is sometimes desirable to have the manhole



RECESS DROP MANHOLE.



PIPE DROP MANHOLE.

accessible during times of storm as well as during dry weather. In some cases separate vertical chambers confine both the sewage and the combined storm flow so that the manhole proper can be entered safely.

Erosion of the bottom and inside faces of the manhole may be prevented by providing a free path for the storm flow so that no erosion can occur except at the bottom and lining the bottom with a wearing surface of vitrified brick, granite block, or other hard durable material. Water cushions also are sometimes used at the bottom where the drop is considerable.

Various means for breaking the fall have been devised and used for the purpose of minimizing erosion from both dry-weather and storm flows. These cause considerable churning, however, and it is well to design drop manholes, when they are unavoidable, so as to minimize churning.

The several types of drop manholes are classified by Mr. Whittemore as follows: The open drop; the recess drop; the pipe drop; the chamber drop; and the cascade and ramp drop.

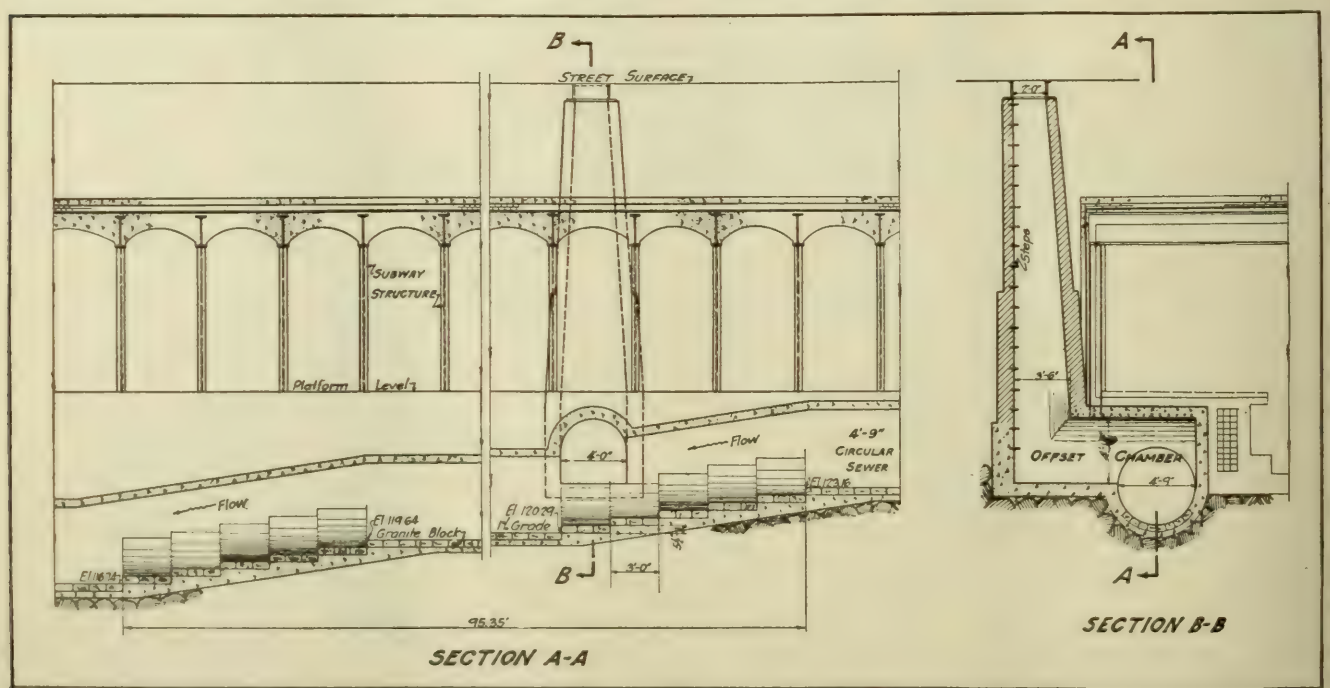
The open drop is merely an ordinary manhole sometimes slightly enlarged in diameter, into which the sewer discharges. This type should be used only where small sewers of moderate flow are concerned.

In the recess drop manhole the side of the manhole towards the upper sewer is sloped from the bottom of the manhole to the invert of such sewer, so that at such invert the diameter parallel to the axis of the upper sewer is considerably greater than at the bottom of the manhole or than the upper portion of the manhole above said sewer. In New York the slope of one to four is common. This produces a recess in the manhole below the upper sewer, down which recess the sewage from such sewer glides. The junction between the slope and the bottom of the lower sewer is curved with a radius of 3 to 5 ft. in the case of large sewers, and is lined with paving blocks. Where only pipe sewers enter the manhole at the higher elevations, the recess may be a bay extending a foot or two from one side and with vertical walls, the upper pipe sewer merely extending through the wall of such bay and the sewage therefrom dropping down in such recess to the bottom of the manhole. This construction should be confined to house sewers only.

In the pipe drop, a vitrified pipe is attached to the outside of the manhole wall, entering through the wall at the bottom of the manhole by a bend of approximately 90 degrees. In the case of a combined sewer, this pipe is supposed to carry the dry-weather flow only, and the upper sewer is continued through an opening through the manhole wall, through which opening a considerable part of the storm water is discharged, the opening in the invert of the upper sewer by which it connects with the drop pipe serving as a leaping weir. If the upper sewer carries house sewage only, all of the sewage should drop through the drop pipe, but the line of the main sewer should be continued by an opening through the wall of the manhole to allow inspection and cleaning of the main sewer. "The advantage of this type lies in the dry weather flow being confined entirely to the drop pipe, thus facilitating inspection of the manhole. The disadvantage is the liability of the bottom bend of the drop pipe becoming frequently obstructed; causing the flow to fall into the manhole proper, and requiring cleaning."

The chamber drop is similar to the pipe drop, except that a separate chamber takes the place of the pipe, ordinarily being constructed by building a curtain wall across the manhole near one side. This chamber is made of such dimensions as to permit the entrance of a man for inspection if occasion requires. This type, like the pipe drop, provides a dry chamber for inspection at all times. It is probably more economical for high drops than the recess type would be, but it is more costly than the pipe drop.

The cascade or ramp drop should not strictly be called a drop manhole, since it takes place over a considerable length of sewer, a manhole ordinarily being provided at about mid-length of the cascade. The cascade consists of a series of steps in the invert of the sewer, which are generally paved with granite or vitrified blocks. The ramp consists of a steep incline in the sewer without the steps. The use of steps was adopted in New York because they render the cleaning and interior examination of the sewer safer for the men and prevent the development of such high velocities of sewage flow as would be developed with a ramp construction, thus reducing erosion of the lining of the sewer below the ramp.



CASCADE DROP. LONGITUDINAL AND CROSS SECTIONS.

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MACHINERY IN SEWAGE TREATMENT.

It undoubtedly has impressed most of those who have read descriptions of activated sludge systems of treating sewage that there was more power and machinery employed than in any of the older processes of treatment, but probably few realize to what an extent this is true. This point is brought out quite prominently, however, in a report which is abstracted in this issue, in which the engineers describe a general plan for a plant to treat 50,000,000 gallons a day of sewage from the Chicago stockyards district. Of a total estimated cost of about $2,760,000, $1,470,000 is for machinery and buildings to house the same. The plant is to be operated by electricity and an energy of 9,050 kw. will be required, operating about 50 motors. The operating cost is estimated at $455,700, of which $270,000 is for power and $98,000 for supplies and repairs. The amount of attention required by the plant, also, is indicated by the fact that 98 men are considered necessary for this purpose, this including engineers, oilers, press operators, electrician, machinist, steamfitters, etc., as well as day laborers.

A large part of this machinery and operating cost is in connection with sludge pressing and drying, but some such treatment of the sludge seems to be generally considered to be necessary in large installations of the activated sludge process, more necessary, perhaps, than in any other. Aside from this, however, nearly one-half of the estimated cost of the above plant was required for providing compressed air for the aeration tanks and for the screen and pump house, which are necessarily independent of any treatment of the sludge.

This feature of this process should be carefully considered in deciding whether it or some other shall be adopted in any particular case. Extensive machinery means the continual employment of engineers for operating it and an annual outlay for repairs and supplies as well as for fuel. It also probably means a higher rate of depreciation and of obsolescence than obtains with almost any other method of treatment. For plants located in large cities where mechanics are readily available and of such size that a number of employees must be retained on any type of plant to supervise it, this may not be an objectionable feature when balanced against the advantages of the treatment; but in a small community where the conditions above named are not found, and where a plant of another kind might be operated with the constant attention of only one man of fair intelligence, an activated sludge plant involves altogether too high a cost for maintenance and for operation as compared with other systems of treating sewage, even though such systems hold out no promise of returns from the sale of fertilizer materials or grease.

LIBERTY BONDS FOR SINKING FUNDS.

When the first Liberty Bonds were offered for sale, we suggested that it would be a patriotic move for the cities of the country to invest some of their Sinking Fund Deposits in these bonds. Some cities have followed this suggestion, but probably the largest amount to be invested by any municipal sinking fund is one decided upon a few days ago, when the Sinking Fund Commissioners of Boston voted to purchase $1,000,000 worth of Liberty Bonds. It is believed that this is the first instance of any American city investing any such large amount of its sinking funds in these bonds, but it is to be hoped that it will not be the last. There certainly can be no safer investment for sinking funds, and the city by taking such action offers the best possible argument to its citizens for assisting in floating the loan.

UTILIZING GARBAGE.

With the duties which our entrance into the war has placed upon American citizens, both individuals and communities, the matter of disposal of municipal wastes takes on a somewhat new aspect, in that the arguments for utilization of these waste matters are increased by the additional one of the necessity of conserving all of the country's resources, and especially those of food.

In addition to the inducement of patriotism there is the further financial one that most of the products derivable from waste food matters have greatly increased in price, and therefore methods of utilizing garbage which formerly promised to yield little if any net returns now look much more attractive.

Returns from garbage are theoretically practicable by utilizing the heat created by burning it (when mixed with other and more combustible wastes), by treating it in plants which recover from it grease and tankage, by feeding to hogs, and by using directly as a fertilizer by plowing it into the ground. Promising as the figures have been made to appear, there seem to be very few plants where garbage and municipal wastes are burned in which the utilization of the heat created more than offsets or even equals the cost of operating the plant combined with overhead charges on the same.

Several cities have apparently realized a good net profit from the operation of reduction plants, but it is believed that such plants are so elaborate and expensive that they can be operated with profit only by the larger cities. Utilization of garbage by transforming it into pork by way of the trough requires small capital expenditure and,

when properly operated, seems to assure good returns, and these should be especially favorable with the present high price of pork and all the by-products of hog slaughtering. Municipalities, however, if they adopt disposal by hog raising, should insure that none of the pork so raised is diseased, and this will ordinarily require that the garbage be collected and fed before it has had an opportunity to begin putrefaction.

The above is suggested by the news that Minneapolis, Minn., is now considering the abandoning of its incinerating plant, and substituting for it either reduction or feeding to hogs. The city engineer, F. W. Cappelen, has reported that a municipal piggery, in which the pigs are fed upon the garbage of the city, would yield an annual profit of $70,000, whereas the present plant for burning garbage and refuse and using the heat for heating and lighting public buildings and streets is operated at a net loss. This movement is supported by citizens who object to the present central loading station, where the garbage is transferred from collecting wagons to railroad cars. Two propositions have been made to the city, one by a St. Paul firm which offers 50c. a ton for the garbage delivered on cars, providing a 3-year contract is given, or 55c. for a 5-year contract; while a Chicago firm offers to build a reduction plant outside the city and pay the city for the garbage a sum which has not been made public.

The Minneapolis incinerator has had the reputation of being one of the most efficiently operated plants of the kind in the country, but the demand of the entire world for fats and fat products and for fertilizers furnishes a weighty argument for the discontinuance of the plant, for the present at least, and the utilization of the garbage by one of the methods contemplated.

REMOVING ACTIVATED SLUDGE.

The following information concerning some recent experiments at the Milwaukee experimental sewage treatment plant has been kindly furnished by T. Chalkley Hatton, chief engineer of the Sewerage Commission of that city.

Several months ago the Milwaukee Sewerage Commission became impressed with the apparent necessity for using some different method for removing the settled activated sludge from the tanks which supplied the sludge presses. It was suggested that there be tried for this purpose an appliance known as the Dorr thickener.

It was then expected that the thin sludge from the sedimentation tanks could be pumped direct to the sludge tanks, in which it would settle, and the clarified liquor passing off would leave a settled sludge containing considerably less moisture to feed to the press; thus reducing the volume of mixed sludge and water to be treated by the press and correspondingly reducing the time of pressing.

After operating the thickener in a 10-foot diameter sludge tank for a number of months, the thickener was found to be of little advantage in giving a thicker sludge for the press, because time alone could eliminate the water, and the time required to reduce the moisture content from about 99 per cent to 96 per cent was from 4 to 6 hours, according to temperature and character of sludge removed from the sedimentation tanks.

The satisfactory manner in which the thickener continuously removed the settled sludge from the bottom of the tank to a central draw-off witout causing it to remix with the supernatant liquor, however, led to the belief that it could be successfully used in sedimentation tanks to continuously remove the settled sludge to a central draw-off pipe.

Whereupon a flat-bottom tank was erected, 13 feet in diameter and 10 feet effective depth, and a Dorr thickener placed within it, and this has been operating as a sedimentation tank for the aerated mixture of sludge and liquor as it flows from the aerating tanks.

This experiment has enabled the investigators to determine the maximum speed of the plows passing over the bottoms to prevent remixing of the settled sludge with the supernatant liquor, which appears to be 12 feet per minute at the periphery; and the maximum sedimentation per square foot of tank surface, which appears to run from 1,600 to 2,100 gallons per day per square foot of surface, which amount equals our best record for hopper type sedimentation tanks.

Should this apparatus prove as successful as it promises at present, it will overcome two very important objectionable features in the design and operation of the Milwaukee plant, viz.:

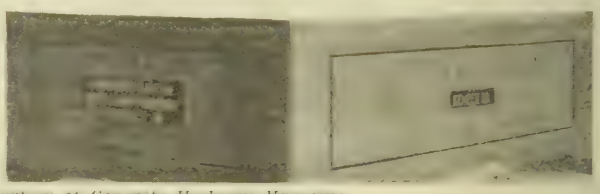
It will eliminate very deep hopper bottom tanks, which are very expensive to build at the Milwaukee site.

By removing the settled sludge surely and continuously it will eliminate the serious trouble which always has been found of the sludge collecting upon the steep slopes of the hopper type, becoming septic and absorbing the dissolved oxygen.

The Milwaukee experiments with hopper bottoms up to slopes of more than 60° have proved that the sludge does collect upon these slopes to such an extent that, unless frequently removed, there is less dissolved oxygen in the effluent than in the influent of the sedimentation tanks.

ROAD MARKERS.

In a recent issue of the *Concrete Highway Magazine*, Wm. H. Boeh, surveyor of Hamilton County, O., described a simple and cheap road marker made of concrete. The signs are placed on both of the inner sides of parapets of bridges and of culvert headwalls, where they extend sufficiently above the surface of the road. The signs give the name of the road, number of the structure, date of erection or such other information as may be desired. The accompanying view shows signs on a culvert on Kemper Road, Hamilton Co., O.



Courtesy of Concrete Highway Magazine

NAMEPLATE AND MARKER ON KEMPER ROAD.

The signs are made of number 12 gauge, 99.84 pure iron. The letters are milled to a depth of one-sixteenth of an inch, and after being galvanized are given a coat of aluminum paint, the balance of the plate being covered by two coats of paint baked. The signs are anchored into the concrete at the corners. The cost of such signs is small, as $1 per line of 15 letters or less may be used for the purpose of making estimates.

COLLECTING WASTE PAPER.

The Street Department of Charleston, S. C., early in 1916 came to an understanding with the Retail Merchants' Association of that city whereby the merchants of the city agreed to place all paper and similar refuse in bags to facilitate collection. The department purchased a specially constructed cart for collecting these bags. This system of collection is reported to have given very satisfactory results.

The WEEK'S NEWS

Baltimore's Cobblestones Eliminated—Wayne County, Mich., Celebrates More Concrete Roads—Maine's Sanitary Survey of Hotels—Health Expenditures in Connecticut Cities—Catskill Aqueduct Completion Celebrated by New York City—Denver's Water Bond Issue Held Up—Portsmouth and Norfolk, Va., Fight for Lakes—Savannah, Ga., Turns Down Water Bonds—Thermal Standard Allowed for New York's Gas—Big Fires in East St. Louis, New York, San Francisco and St. Paul—Celebrating Fire Prevention Day.

ROADS AND PAVEMENTS

Eliminating Cobblestones in Baltimore.

Baltimore, Md.—In the past five years the city has taken big strides in eliminating the old characteristic cobblestones. Now within the corporate limits of the 437 miles of streets and 145 miles of alleys, 344 miles of streets have been paved at an average cost of $50,000 per mile, or $16,200,000, and in the last two years 44 miles of alleys, varying in width from 4 to 20 feet. Those less than eight feet in width were paved with cement sidewalk construction. These alleys are private and were paved at the expense of the abutting property owners. Up to the beginning of 1912 the city had 350 miles of cobblestone streets and alleys, aggregating 5,000,000 square yards. Three commissions have charge of the work of repaving; the street paving commission has charge of all the streets within the city proper; the commission on the opening of new streets has charge of the paving in the annexed districts, and the state roads commission has charge of all state roads, even when they terminate in the heart of Baltimore city. The best pavement applicable to the conditions of traffic in each case is put down. The various kinds of materials include bituminous concrete, asphalt block, vitrified brick, creosoted wood block, and in the cases of some of the country roads asphalt-coated macadam. The movement for better streets began in 1911, when two loans were authorized, one of $5,000,000, to be expended in paving generally, and the other, of $2,500,000, to be used exclusively in the annexed section of the city.

Wayne County Celebrates New Concrete Road.

Detroit, Mich.—The citizens and civic organizations of the city and Wayne county celebrated Good Roads day on October 11 to mark the completion of the Northville Road of the "Outer Belt Drive" of the county's concrete highway system. Thousands of out-of-town guests took part in the celebration including governor Sleeper and his staff and good roads boosters and officials from nearby states and from across the Canadian border. The local automobile companies furnished music and helped in carrying out the plans for the event. The dedication ceremony was impressive. President William E. Metzger and attorney-general Alex. J. Groesbeck wielded shears on a huge banner stretched across the road, symbolizing the removal of bad roads from Wayne county. The banner bore the following inscription: "Wayne County—Bad Roads—Wayne County." When "Bad Roads" was cut from the banner, governor Albert E. Sleeper, with a gold and silver spade, removed from the concrete the last shovelful of dirt. The christening followed, and music, speeches, luncheon and a huge automobile parade concluded the festivities. Wayne county was acclaimed the pioneer in building concrete roads. The season's work amounts to 165 miles, and stretches of brick and asphalt were also constructed. During the year the county road commission spent $400,000, making a total of $3,500,000 since the commission was organized. The original schedule on which the commission has been working—and there has been no change in the general scheme in all these years—will not be completed for some time. Concrete trunk lines on all of the arteries, outer, middle inner belts, are in the plan. The increase in the cost of materials and construction are so much greater than that of the appropriations that a smaller mileage has been necessitated. "During the year we have hired 1,600 men in an endeavor to find 400 who can and will do the work," said Edward N. Hines, chairman of the road commission. "The labor problem has been acute, it has hampered us and the future is none too bright." The commission is now using granite or trap rock for surfacing, as these materials are more durable, but they cost 100 per cent more than the material formerly used. Woodward avenue from the Highland Park limits to the county line is claimed one of the heaviest traveled roads in the world, figured on the basis of width. In 10 hours, during which count was kept, 11,044 vehicles passed along the Woodward avenue road, which is but 18 feet wide.

Land Condemnation for Street Widening Takes Five Years.

New York, N. Y.—Except for the ordering of a number of corrections, justice Scudder in the supreme court has confirmed the report of the Condemnation Commissioners on the Queens Boulevard improvement, after the lapse of nearly five years since the commissioners were appointed. By the time the corrections are made five years will have been consumed by the commissioners. The awards, including interest to November 16, 1916, amount to $4,044,558.41. On June 25, 1915, the supreme court allowed a bill of costs amounting to $52,456.89, and in May of this year the commissioners were allowed to tax an additional bill of $25,712.81. The commissioners condemned 789 parcels and will receive something more than $3,000 each for their services. This proceeding to open and widen Queens Boulevard has been the cause of considerable strife and a vast amount of litigation. As a result of the delay in paying the owners, the city will have an interest bill of much more than $500,000, most of which, however, is included in the $4,044,558.41. It is estimated, however, that the interest which has piled up since the date of the final report, November 13, 1916, will amount to almost $200,000. Of the assessments, 20 per cent will fall on the local area, the Borough of Queens will pay 30 per cent and the city at large the other 50.

SEWERAGE AND SANITATION

Navy Secretary Asks Sanitary Improvements.

Charleston, W. Va.—Secretary of the Navy Daniels has written a letter to mayor MacQueen in regard to the sanitary conditions of the city. The secretary refers to a report made by the United States public health service, and asks that steps be taken to carry out the suggestions embodied in that report. The importance of the health of the city of Charleston in regard to the work to be done at the new government plants is impressed very firmly. Mayor MacQueen says that many of the recommendations had been anticipated, and that much had been done in the last few months to improve the sanitary condition of the city. The health department has been put on a firm footing, said the mayor and the salary of the health commissioner has been doubled, so that the commissioner can afford to give more time to the work. A dairy inspector and a visiting nurse have been appointed lately and are now at work. The water company has complied with recommendations in the secretary's letter. According to the health commissioner, hundreds of surface privies have been covered during the last few months. With the proper funds at hand, the mayor is confident that

the city's sanitary condition will meet with the approval of the government experts. Among the recommendations are the following: 1. "Water Supply—That any contract with the West Virginia water and electric company for water supply provide that the water to be furnished comply with existing standards of purity for water supplied to railroad trains in interstate traffic, as laid down by the treasury department. That this contract provide also for the immediate installation of such filter units at the filtration plant as are necessary to provide the supply to be delivered." 2. "Health Administration—That the department recommend to the city of Charleston that the health department be immediately reorganized in such manner as to provide for active and effective sanitary administration." 3. "Control of Surrounding Territory—That, in the event that annexation of the territory surrounding the plant to the city of Charleston be unduly delayed arrangements be made with the city of Charleston and the county of Kanawha for joint supervision of sanitation in this territory for the sewering and abolition of all surface privies within one mile of the plant." 4. "Housing—That the absence of proper housing in the city or its immediate environment at this time be given serious consideration and that plans for the systematic and satisfactory housing of the employees of the navy department be worked out." The secretary says: "It appears from the report that there is room for improvement in some of the things which have come to be looked upon by progressive communities as fundamental principles underlying successful municipal sanitation; notably an efficient health department, a sufficient and safe water supply, proper disposal of sewage and garbage, and prompt reports of communicable diseases with municipal control." The mayor has sent copies of the secretary's letter to the water company, the county officials and the chamber of commerce.

Sanitary Survey of Maine Hotels.

Augusta, Me.—During the past month the new state department of health of Maine has been engaged in making a sanitary survey of the hotels and summer resorts. This work, which is being done with the full co-operation of the Maine Hotel association and the hotel men individually, has been very gratifying to the department in showing that sanitary conditions are well cared for and the Maine hotel men are anxious to do everything possible for the welfare and comfort of their guests. A letter has recently been sent to the members of the hotel association by the secretary, Wilbur T. Emerson, setting forth the nature of the work and its potential advantages. Up to the present time the survey has included only those hotels along the coast, but during the next few months many of the inland vacation hotels and commercial houses will be visited. Data is being collected at each hotel upon the location and condition of the building, the storage and handling of food, the water and milk supplies, sewage and garbage disposal, toilet facilities, plumbing, and the adequacy of employees' quarters. This data will be considered during the annual meeting of the hotel association in December at a conference with the health authorities and it is expected that plans will be made for continued and regular hotel inspection. The survey is being made under the direction of the health commissioner, Dr. L. D. Bristol, by C. E. Turner, who is an instructor in the department of biology and public health at the Massachusetts Institute of Technology and in the Harvard-Technology school for health officers.

Health Expenditures Too Low.

Hartford, Conn.—In the recent bulletin of the state health department, health commissioner John T. Black has a vigorous article headed, "How Much Does Your Town Pay?" It says: "Health officers' reports last year show that the smaller towns of the state are paying out very small sums for the protection of their health. At the present time most towns are working on their annual budget and they should seriously consider the amount to be allotted for health. If the town has a death rate of nine per thousand or less, if the records show no deaths from tuberculosis or other preventable diseases, if not more than 5 per cent of the babies born have died and if the school attendance has been 98 per cent perfect, the amount expended last year will probably be ample for the coming year. The above standard is possible and has been reached, but not in Connecticut. It means that any community reaching this standard is saving its citizens thousands of dollars a year at a comparatively small expenditure. A good health officer can guarantee his town officials to save a life with every $500 placed at his disposal, and a well trained health officer can accomplish the same result with $200. The state department of health has been working on a 2 cent per capita basis—this coming year it will have a little over 4 cents but it should have 8 or 10 cents to properly serve the state. From the health officers' reports last year the following per capita expenditures were tabulated, to which we have added the amount we think necessary to expend to properly protect the health.

AVERAGE PER CAPITA EXPENDITURES, 1916.*

For Health.	Expended.	Advised.
Cities of over 50,000 pop.....	.40	.65
Cities of 25 to 50,000 pop.....	.136	.50
Cities of 15 to 25,000 pop.....	.13	.40
Cities of 10 to 15,000 pop.....	.075	.30
Towns of 5 to 10,000 pop.....	.07	.25
Towns under 5,000 pop.....	.045	.20

This shows that many towns have not spent enough money for health to buy each person a cheap cigar or a bag of peanuts."

New Sanitary Code.

Lancaster, O.—The new sanitary code recently adopted by the board of health when properly put into operation is expected to mark a new era in the sanitary condition of the city and to do much to protect the health of its citizens. The new code will provide for the inspection of the milk sold in the city. Milk dealers must obtain a permit from the health department before selling milk in the city. Under the new code there will be a better observation of the foods sold in the city and closer observation on hotels, restaurants, bakeries and those who deal i vegetables and fruits. The new code provides for the abandoning of out closets as rapidly as possible where sewer connections are available. The new code will have a closer enforcement of the quarantine laws on communicable diseases. The diseases added under the code for quarantine are whooping cough, measles and chickenpox. The new code provides for a sanitary police officer.

Public Health Nurses Around Army Camps.

Washington, D. C.—Fifty public health nurses have been assigned for duty by the American Red Cross to the zones around the National Army cantonments, National Guard camps, and naval bases. The nurses will work under the Red Cross sanitary directors in co-operation with the local, state and federal health authorities. Nurses have already taken up their work in civil districts around the cantonments at Hattiesburg, Miss.; Fort Riley, Kans.; Des Moines, Iowa; Louisville, Ky.; Little Rock, Ark.; Ayer, Mass.; Chillicothe, Ohio; Atlanta, Ga.; Newport News and Petersburg, Va. As visiting nurses in the rural territory and cities adjoining the camps, the Red Cross nurses assigned to public health work will endeavor to prevent the spread of tuberculosis, malaria, and social diseases, and to strengthen the local infant-welfare programs. Nurses have been chosen for this service by Miss Jane A. Delano, chairman of the National Committee on Red Cross Nursing, with special reference to the public health needs of the nation as a whole. If the public health nursing service of the state in which the cantonment is situated is strong in numbers the Red Cross has called upon nurses from that state. Otherwise, nurses have been chosen from the states from which the troops in training have been drawn. A permanent Red Cross public health service will undoubtedly be the outcome of the work now being undertaken in Army districts. Besides the special work in camp zones, Red Cross nurses in the Town and Country Nursing Service are at work through-

out the country, largely in rural and mining communities. Ninety four women are so engaged in nursing and teaching the care and feeding of infants, first aid and home dietetics, and assisting the fight against tuberculosis. It has been estimated that 48 per cent of the Union troops in the Civil War came from the country districts. While the percentage will not be so large in this war, the Red Cross has undertaken to see that their families and homes are kept well and safe against the day of the country soldier's return.

WATER SUPPLY

To Begin Work on Otay Dam.

San Diego, Cal.—The council's action in awarding a contract to James Kennedy means that work on the Lower Otay dam will begin as soon as Kennedy can assemble his working forces. The contract requires that Kennedy furnish a bond in the sum of $300,000 to protect material dealers and labor and one in the sum of $150,000 for faithful performance of contract. The council came to a conclusion that the Kennedy bid of $586,732 was the best bargain the city could make, following a heated discussion. The council's action came after a statement and a written agreement by Blymeyer & Co., San Francisco, purchasers of the $682,200 bonds for the improvement that they would waive the opinion of Dillon, Thomson & Clay, the New York firm of bond attorneys, as to the validity of the bonds, saying they would take them as they are. So bitter were some of the councilmen against Spitzer, Rorick & Co., for failure of that firm to take the Otay bonds that councilman Bacon introduced a resolution directing the city attorney to legally proceed against the Toledo bond firm to collect $28,000, the amount of the premium offered, and the accrued interest, by that firm when it bid on the bonds; also to be included damages of $1,000 a day from the time Spitzer, Rorick & Co. refused to take the bonds. This resolution failed to carry. The council directed the clerk to hold a certified check of $6,822 deposited by Spitzer, Rorick & Co. for faithful performance of contract to take the bonds. Blymeyer & Co. bid $586,000, which was accepted.

New York Celebrates Catskill Aqueduct.

New York, N. Y.—With a pageant, concerts, speeches, dinners, medals and exhibitions, New York has celebrated the completion of the Catskill aqueduct. Mayor Mitchel on behalf of the city formally accepted the complete system at exercises in the aldermanic chamber at the city hall. He described the work as a feat of engineering which approached the building of the Panama Canal in magnitude and exceeded it in difficulty. Mayor Mitchel bestowed upon ex-mayor George B. McClellan the chief credit for conceiving and driving through the project for a vast supply of pure water for New York City, and named J. Waldo Smith, the chief engineer of the Board of Water Supply, as the man to whom most praise was due for conquering difficulties which had never before been faced by engineers. On behalf of the city he thanked the enginers under Mr. Smith and the contractors who had worked on the water system for completing it ahead of time, at about $7,000,000 less than the estimated cost and without the suggestion of a hitch or of scandal. Then mayor Mitchel accepted from an unknown donor the jet fountain in Central Park in the afternoon and officially turned on the Catskill water, which leaped from the fountain to a height of eighty feet, while about 2,000 persons cheered. Fifteen thousand school children took part in the pageant entitled "The Good Gift of Water," written for the occasion by Dr. Edward Hagaman Hall. An exhibition of Hudson River pictures is being shown as a part of the aqueduct celebration in the Metropolitan Museum of Art. Medals for distinguished service in creating the Catskill water system were presented at the dinner given by the mayor's committee to mayor Mitchel, ex-mayor George B. McClellan, chief engineer J. Waldo Smith, Charles Strauss, president of the Board of Water Supply; Charles Noyes Chadwick, a member of the board from its inception; John F. Galvin of the Board of Water Supply; Charles A. Shaw, an ex-member of the board and to the family of the late J. Edward Simmons. This gigantic work of engineering and construction is finished after ten years labor. After the dry years of 1895 and 1896 the danger of a water famine was thoroughly realized. Then began the term of protracted debate and experimentation which ended with the acceptance of the prodigious plan of water supply. Commissioners were appointed by mayor McClellan in June, 1905, and J. Waldo Smith was named chief engineer, a position he still holds, in August of that year. An experimental shaft was sunk at the Storm King end of the Hudson River siphon in February, 1907, and actual work of constructing the aqueduct was begun in June of that year. It has cost $140,000,000, and there has been no waste. It has not been delayed by labor strikes or accidents. The dam at Ashokan is in many ways the greatest structure of its kind in the world. The immense lake which forms the chief reservoir was made by flooding 15,000 acres of land. Nine villages, with many outlying farms, inns, schools, and churches, were removed. All property confiscated was paid for. Eleven miles of the tracks of the Ulster & Delaware Railroad were relocated. No fewer than thirty-two cemeteries were removed. In a separate reservoir near the dam the water is aerated. From its surface the water rises in many jets from forty to sixty feet, falling in the form of spray. The aeration plant is surrounded by trees and flowers, and the whole region, comprising 257 square miles, has been beautifully transformed. North of the Ashokan reservoir, which taps the Esopus watershed, they are constructing now the new works of the Schoharie watershed, which will supplement the Esopus supply. Each of these related systems will supply a minimum daily flow of 250,000,000 gallons. The available reserve capacity of the Ashokan reservoir alone is 128,000,000,000 gallons. From this reservoir the water is sent by gravity ninety-two miles to the city's northern boundary. The Kensico reservoir, with its capacity of 29,000,000,000 gallons, a supply for the city for two months, and the Hill View reservoir at Yonkers are two important parts of the great work and the flow continues, through conduits and pipes, by way of river tunnels and one under the Narrows, to all the boroughs and to Silver Lake reservoir on Staten Island, the terminal, 120 miles from Ashokan.

Seek to Restrain $8,000,000 Bond Issue.

Denver, Colo.—The question of municipal ownership of the water supply of the city is involved in the suit of Clara A. Wheeler and Frank S. Lusk, seeking to restrain the city of Denver from the issuance of $8,000,000 bonds for the construction of a city water plant and seeking to restrain the city from enforcing an ordinance requiring a twenty per cent reduction in water rates charged by the Denver Union Water Company. The suit was filed June 1, 1911, and dismissed by judge Robert E. Lewis, in federal district court, on the ground that collusion existed between the water company and the plaintiffs. The case was appealed by the company, in whose behalf the plaintiffs were suing, to the United States supreme court, where the case was ordered back to the local court on the ground that the trial judge was in error. In the meantime, however, another case, known as the franchise case, had been decided in Washington, covering virtually the same points included in the Wheeler-Lusk suit. The franchise suit contested the right of the water company to use the streets of Denver. When the Wheeler-Lusk case was brought up in federal court here again, an amended petition was filed, touching upon other points not covered in the franchise case decision. Judge Lewis, however, again dismissed the suit and it was taken into the circuit court of appeals where judge Lewis' decision was upheld. The plaintiffs then appealed again to the supreme court. The city's next move was to file a motion in the United States supreme court to dismiss the suit, on the ground that the plaintiffs, after appealing to the circuit court of appeals, had no right to carry the case to the supreme court. In 1914 the city passed an ordinance requiring the horizontal reduction of twenty per cent in water rates charged by the Denver Union Water company. Judge Lewis issued a temporary restraining order which he later made permanent, after a valuation of the

company's properties had been made, by W. J. Chinn, of Colorado Springs, appointed by the court as special master in chancery. Mr. Chinn's report gave the valuation at $13,459,000. Since the case has been appealed the water company has given the city an option to purchase the system at a price to be fixed by special master Chinn, plus any additions and betterments made since that time. The company also had agreed to be bound by any price to which the United States supreme court may reduce the present valuation. City officials have agreed to hold an election within a year following the high court's decision in which the people shall vote upon the purchase of the water plant at a price yet to be determined. In its brief the city puts the valuation of the company at $4,000,000.

Cities Fight for Lake Water Supplies.

Portsmouth, Va.—City attorney Happer, following instructions by the city council, has filed in the Court of Hustings a petition for an injunction to restrain the city of Norfolk from acquiring from the Portsmouth, Berkley and Suffolk Water Company, Lakes Phillips and Burnt Mills. The court is also asked by petition to enjoin the Portsmouth, Berkley and Suffolk Water Company, by its president, from executing a deed to the property. The petition also asks that Norfolk be restrained from taking up the deed, and that B. Gray Tunstall, its treasurer, be restrained from making payment for the property. The petition affirms that all of the four lakes owned by the Portsmouth, Berkley and Suffolk Water Company—Kilby, Cahoon, Phillips and Burnt Mills—are needed to meet the growing demands of the city of Portsmouth, and of the United States government. It affirms that should the sale be consummated the city of Portsmouth and the United States government will be denied an adequate supply of water, as Kilby and Cahoon lakes are insufficient for that purpose. It charges that the sale is in violation of the contract between the water company and the city, whereby the city is given the right at the expiration of the present contract, in April next, to take over the water company's holdings, and is also in violation of acts of assembly. It is charged that the acts of defendants in the premises affect rights which cannot be compensated in damages. At a meeting of the Portsmouth Council, city manager Bates declared that he has received a communication from Dr. George B. Young, of the United States public health service, in which the health officer states that the source of the city's water is adequate for present needs, but is not capable of being greatly expanded. He also called attention to the fact that the navy yard in May, 1916, used 8,000,000 gallons and in August, 1917, the plant used over 22,000,000 gallons of water.

Norfolk, Va.—The move to acquire the lakes for $100,000 is considered by the Norfolk board of aldermen as a successful end to the efforts of many years of the city to secure an adequate water supply. "The water question is solved for years to come," declared president J. C. Prince, chairman of the water committee, which conducted the negotiations. "The city of Norfolk now has Burnt Mills lake and Lake Phillips, and nothing short of a foreign invasion can take them away," declared city attorney Pilcher, who conducted the legal phase of the fight. Lake Phillips is in Nansemond county and Burnt Mills lake is in Isle of Wight county. Burnt Mills is the larger lake of the two, and furnishes the larger supply of water, the two together having an estimated capacity of 30,000,000 gallons per day, sufficient to supply a population of 250,000 persons. The present water supply of the city of Norfolk is 10,000,000 gallons per day, sufficient to supply 150,000 persons, so that the water supply sources of the city, developed and undeveloped, are sufficient to supply a population of 400,000 persons and manufacturing plants and industries in large numbers. Both because of the cost of material and the scarcity of labor and because the extra supply is not yet needed, the work of development will not be undertaken now or in the near future. The city of Norfolk is at present using not more than 6,000,000 gallons daily and has a supply of 10,000,000 gallons. The latest and final campaign to give Norfolk water supply adequate to future needs and necessary to the city's growth commercially and in population began last autumn, with the adoption of a resolution authorizing the city attorney to institute proceedings in condemnation. As required by law, efforts were made by negotations to secure from the Portsmouth, Berkley & Suffolk Water Company a price at which the lakes could be purchased. The company refused to set a price even as a basis for negotiations, and the city attorney filed proceedings in the circuit court of Nansemond county. JudgeMcLemore decided that too long a time had elapsed since negotiations had failed between the time of attempting to negotiate with the company and that of filing the petition for condemnaton of the property and suggested that the negotiations be renewed. This was done and this time the Portsmouth, Berkley & Suffolk Water Company indicated willingness to discuss terms of sale without waiting for condemnation proceedings. A conference between the board of control, the water committee of the council, city engineer Taylor and city attorney Pilcher on the one hand and officials of the company on the other followed, taking place in August. Another conference was later held in New York, and there an option for the purchase of the lakes was signed, president Prince having been authorized to reach such agreement. The option price was $100,000.

$500,000 Water Bond Issue Defeated.

Savannah, Ga.—The bond issue for the expenditure of $500,000 for the rehabilitation of the waterworks was defeated by a vote of 413 against 376, only 789 votes being cast out of a total registration of 1,702. The affirmative side needed 1,134 votes to win. After the election mayor Pierpont said the plant would be improved from time to time as funds permitted. The indifference of the administration, the uncertainty as to what body would have control of the expenditure of the money, the lack of a definite understanding regarding the method of doing the work and the conflicting interviews on the subject given out by the mayor were ascribed as the chief reasons for the adverse vote. The issue was to have been divided into one thousand bonds of $500 each face value, to be payable within twenty-five years from their date, to bear interest at the rate of 4½ per cent per annum, interest being paid semi-annually. The bonds were to have been paid and retired as follows: "By the expiration of the first year of their life $2,000 face value of said bonds shall be paid and retired, and each and every year thereafter an increase of $1,500 face value of bonds over and above the previous amount of bonds retired shall be paid and retired, that is to say, the second annual payment shall include and retire bonds of the face value of $3,500, the third annual payment shall include and retire bonds of the face value of $5,000, and so on, the payments adding each year $1,500 of the face value of bonds to the number last paid and retired, thus retiring all of the bonds by their maturity." A sinking fund was to have been established for the purpose of carrying out this plan of payment.

Plan Big Flood Water Storage Project.

Albany, N. Y.—At a conference of representatives of the principal cities in the Hudson valley, which was held in the office of mayor Stevens in this city, the proposed plan for the storage flood waters of the Hudson valley was adopted. The plan calls for an immense dam at Conklingville which would create a lake the size of Lake George, fully 30 miles long, and covering the valley of the Sacandaga well up into the mountains. It would bring what is now Sacandaga park completely under water, and would also inundate the present location of Northville. The conference was attended by mayor Stevens, corporation counsel Andrews and president J. Y. Read of the Albany Chamber of Commerce, representing Albany; mayor Burns, of Troy, and president Cluett, of the Troy Chamber of Commerce, representing Troy; president Imrie of the Glens Falls Chamber of Commerce, and representatives from Mechanicville, Hudson Falls, Fort Edward and Castleton. George N. Ostrander, of Albany, and Frank L. Bell and J. Elmer West, of Glens Falls, representing the power owners of the upper Hudson river, were also present and stated

that the power owners would be willing to bear 95 per cent. of the cost of construction. The conference was called together by mayor Stevens under the provisions of section 662 of the laws of 1915, creating the state commission for the control of storage water. This commission consists of the state conservation commissioner, attorney general and state engineer. It was decided to petition the state commission at once. It will then be the duty of the state commission to apply to the governor for the appointment of a local commission composed of residents of the district to be benefited. The cost of the proposed work would be $6,000,000. The plan calls for a storage and control of one-third of the total flood waters of the Hudson river.

STREET LIGHTING AND POWER

New White Way Opened.

Pine Bluff, Ark.—Pine Bluff's new street lighting system is now the pride of the town. The city took on "metropolitan airs" when mayor Simon Bloom threw a switch which turned the current into the new system installed throughout the business and residence sections of the city. The inauguration of the new lighting system was made the occasion for an appropriate celebration by city officials, the lighting company, civic associations and citizens in general. The new lighting system consists of 106 ornamental posts instead of the 56 posts formerly used, while the illumination will be furnished by one light of 250 candle power to each post instead of four lights of 50 candle power each per post under the old system. Under the new system there are four poles with one light each along each side of the block, at uniform distances. This change is in the business section of the city, while the residence portion of the city will be illuminated with 473 incandescent lights of 60 candle power instead of the 32 candle power lights formerly used. The members of the water and light committee, together with mayor Bloom, began negotiations with the Pine Bluff company some months ago and reached an agreement which was endorsed by the city council. Under the new system the city receives about 100 per cent increased efficiency of lighting service at an increase of about 20 per cent in cost. The cost is now borne by the city while the former lights in the business district were paid for by the business men who cared to have a pole erected.

Heat Standard for New York Gas.

New York, N. Y.—The public service commission has issued an order granting the recent application of the gas companies of the city to change the standard unit from candlepower to British thermal heat unit. The commission took the action to permit the companies to produce to a much larger extent the by-product "TNT," which the government needs in the manufacture of munitions. The commission did not recede, however, from its position that consumers who have been supplied with gas of more than 585 units of heat per cubic foot shall not suffer by the change. Tests by experts of the commission show that the average of heat units supplied under the present 22-candlepower standard is 659. The order provides that the companies shall make a rebate to all consumers in proportion to the monthly average of heat units supply below 650. This would make the charge on gas of 585 units, suggested by counsel for the companies, 70 cents a thousand cubic feet, a reduction of 10 cents from the existing scale. Commissioner Travis H. Whitney said the amount rebated to the consumers might well figure in the cost of producing the by-product "TNT." He said it seemed certain the government would have no objection to such a method of computing the cost. This means that the government and not the companies would pay the rebates to the consumers. At the hearings before the commission, Dr. Charles H. Herty, former President of the New York Society of Chemists, advocated the change. The changing of the gas valuing method from the illumination standard to the heat standard was previously pressed because it would cheapen the manufacture of gas, and because the use of a cheaper oil would produce more toluol. Dr. Herty said that he had talked with General Crozier, Chief of Ordnance, U. S. A., who had told him it was necessary to get all of the toluol possible for use in the war, not only by the United States, but by Great Britain. He had said "that if all the toluol of every one of the gas companies was available, the total would be only 130,000,000 pounds for a year, or about half of the amount needed for operations based on 1,000,000 fighting men." The witness, in reply to a question, admitted that the government had arranged to insure the gas companies against all risks attached to a change in plant made necessary in getting out the greatest quantity of toluol. Chairman Straus and commissioner Hervey maintained that the consumer should profit as well as the company by any cheapening of the manufacture of gas through a change of standards. William N. Dykman, counsel for the Brooklyn Union Gas Company, said that his company was not earning 4 per cent. on its investment and that if the price of gas should be put into the question long litigation would face the commission. In the meantime the government would suffer, he said. Robert A. Carter, for the Consolidated Gas company, indorsed the stand taken by Mr. Dykman, and said the Consolidated company was now selling gas at 80 cents a thousand feet that was worth 95 cents.

Electric Light Rates Reduced.

Fort Worth, Tex.—Electric light consumers in Fort Worth are to be saved approximately $50,000 annually as the result of a reduction secured in the light rates by mayor W. D. Davis and light commissioner Selwin Smith. Not only is the saving effected for the consumers, but the new contract with the Fort Worth Light & Power Company makes it very probable that the all-night street lighting system will be inaugurated by the city within a short time at practically no added cost. At this time the city is operating the street lights on a moonlight schedule. Mayor Davis and commissioner Smith have been working for the reduction for some time. The minimum rate of 50 cents remains in force. On and after Nov. 1 the charge per kilowatt hour will be 6 cents and 8 cents, whereas before it has been 6 cents and 10 cents. This, according to estimates made by commissioner Smith, will amount to a total net reduction of 20 per cent. to both domestic and commercial users.

Eight Per Cent Considered "Fair Return."

St. Louis, Mo.—James D. Mortimer, of New York, president of the Union Electric Light and Power Co., testifying before the state public service commission declared that he considered a net return of 8 per cent on money invested in a public utility such as the Union Electric, a necessary and fair return. At the same time, he testified that it has become very difficult to attract new capital to public utilities corporations, that their securities have come to be regarded as semi-hazardous, and that regulation has discouraged investment in such corporations. He added that practically the only method by which the Union Electric can obtain new capital is by the sale of its 7 per cent preferred stock to customers, of which $1,000,000 was offered a short time ago. The hearing was in connection with the complaint of the Engineers' Incitation Club, of St. Louis, that the company's rates are excessive and discriminatory. The complaint was filed two years ago and the hearings have been continued from time to time. Officials of the company presented their estimate of approximately $34,000,000 as the reproduction cost of the corporation, including valuation of physical and intangible assets. The engineer for the public service commission several months ago made an appraisal fixing the physical valuation at $22,757,000. It is the contention of the Engineers' Incitation Club, represented by attorney William F. Woerner, a former member of the state public service commission, that the rates of the company are based on an excessive valuation and the public service commission is being asked to fix a reasonable valuation upon which the company should be allowed to earn a fair return. Elaborating upon this idea of a fair return, Mortimer said it should be determined by what it cost to attract new capital to the concern. This cost, under present conditions, he said, was not less than 8 per cent, as follows: 6 per cent for interest and about 2

per cent for promotion fees, advertising, broker's commissions and other items. The $1,000,000 of preferred stock being offered to the customers of the company bears 7 per cent interest, and is being sold directly by officers of the Union Electric. Mortimer also testified that he considered it necessary for a public utility to receive a gross annual revenue of from 40 to 50 per cent of its invested capital in order to pay a net return of about 8 per cent. He gave as a reason for this the nature of the investment, the high operating expenses in proportion to the investment, and the immobility of the capital. Voluminous testimony in the nature of briefs made by various officials of the company was introduced in substantiation of the company's own appraisal of its reproduction cost. These briefs went into detail and criticised many items of the physical valuation as fixed by the commission's engineer. It was testified by Union Electric officials that the company's profits since 1913 were as follows: 1913, $1,791,327.31; 1914, $1,766,813.08; 1915, $1,707,939.50; 1916, $1,589,113.84; six months, 1917, $711,-474.44.

FIRE AND POLICE

Big Elevator Fire.

East St. Louis, Ill.—Fire, supposed to be of incendiary origin, destroyed the Acme elevator and adjacent warehouses with an estimated loss of $235,000, of which $35,000 is on the buildings and $200,000 on the contents. Near the elevator are three big packing plants, but fortunately only a light wind was blowing and the flames did not spread to these big industries. The fire was discovered by a negro watchman, the only employe of the elevator company on the premises. He said that when first seen the fire was at the south end of the main building. Switchmen for the Terminal Railroad Company, the tracks of which serve the elevator, are quoted as saying the flames broke out in three parts of the structure at about the same time. Three cars of oats had been loaded day before and were standing on a service track. A terminal engine got one of these cars out before it was damaged, but the two others were destroyed. Chief Tobin had all of the fire companies except one at the fire, but there was little to be done except to keep the flames from spreading and try to save some of the sacked grain in outlying warehouses.

$2,000,000 Grain Stored for Allies Burned.

New York, N. Y.—Hundreds of thousands of bushels of grain destined for consumption in the United States and in Allied countries were destroyed in a spectacular fire of undetermined origin in Dow's Stores, part of the property owned by the New York Dock company, at the East River, Brooklyn. Suspicion that an incendiary may have caused the fire led both fire chief John F. Kenlon and fire marshal Thomas Brophy to announce that its origin will be further investigated. Chief Kenlon, who characterized the destruction of all to scarce grain as the worst fire in the city since the old Equitable Building burned down, denied that the fire resulted from a dust explosion, as Marshal Brophy had suggested, and added that the fact that there had been three times as many waterfront fires as normally since the United States entered the war has convinced him that they cannot all have occurred from natural causes. Marshal Brophy said that the examination of many witnesses failed to reveal the fact that the explosions and the resulting flames were of an incendiary origin. He based his opinion, he said, chiefly on the testimony of four men who were in tower No. 2, one of the three great towers in the warehouse where the flames started. According to their story, the men smelled rubber burning and observed bluish smoke coming from a nearby shaft. Then they shut off all the machinery in their tower, which was nearest to the river. In two minutes they heard an explosion and saw flames. As they were hurrying to the street below they heard another explosion. Despite the efforts of firemen from every part of Brooklyn, assistd by several companies from Manhattan and by three fire patrol boats, it became apparent that the entire square block would be in ruins before the leaping flames were extinguished. A brisk southeast wind kept the flames bursting into the air all the afternoon and evening. The lives of the firemen were in danger all day as the red-hot brick walls would crumble and fall to the ground. Early in the morning the first tower tumbled; by 2 o'clock in the afternoon the second had fallen, and by 5 o'clock the third was in ruins. Chief Kenlon said he would have lost forty or fifty of his men when the first tower fell if they had not been ordered to leave when it was seen that the fight was hopeless. Three lines of hose were lost. When the second tower was toppling men from companies 202, 207 and 224 were near the roof. The wind blew sparks into their faces, and they, too, retreated just in time to save their lives. Captain Michael Manning, of Engine Company 224, is in hospital, seriously hurt. He was pinned under a girder when the first tower fell. Captain Lyons, of Engine Company 66, was also hurt, getting a fractured wrist and face burns. Owen Ward, a fireman of Truck Company 204, was also taken to the hospital seriously injured. "Since the war started," chief Kenlon said, "we have had twice as much work in the fire department as normally, and yet draft officials have taken away 300 of our men, and altogether, I believe, 500 are eligible. In these days, when important shipments of war materials are leaving the city, the strength of the fire department should be augmented instead of sapped. There have been fifty-six ship fires here within a year, and waterfront fires are suspiciously frequent."

Celebrating Fire Prevention Day.

New York, N. Y.—Fire Prevention Day was celebrated by a parade arranged by commissioner Adamson. It was a spectacular success, in spite of the fact that it was held in a slight rain. There were eighteen floats portraying strikingly preventable fire causes. One was a gigantic cigarette, with a text stating that carelessness with cigarettes had cost $444,032 last year and urging smokers to be careful in throwing away lighted butts. A float represented children playing with matches, and stated that this amusement for children had cost $103,380 last year. A placard on the float read: "How fires affect the families. Every family of five pays $12.50 a year fire tax. Practice fire prevention. Save cash." Washington Irving high school was represented in the parade by a float on which pretty girls rode. The text on each side of this read: "Education helps the city to conquer fires." A large sign carried by hook and ladder truck 5 read: "Three-quarters of our fires are caused by carelessness. Two thousand lives are lost each year and 6,000 persons are injured in fires. We spend $415 a minute for fire waste. Fire prevention would stop this needless drain on our resources." In the parade were a number of fire engines, hose wagons, and hook and ladder trucks, some of them carrying the following injunctions: "Clean up rubbish," Be careful with matches," "Overhaul your wires," "We can put out fires better today than ever, but it costs money. Why have fires to put out?" Thousands of red placards calling attention to the day were posted broadcast over the city by street railway companies, department stores, restaurants, banks, and other commercial and civic organizations who have responded generously to the commissioner's appeal for assistance in the observance of the day. Special exercises were held in all the public schools and in the parochial schools of New York and Brooklyn. These included a fire drill, the children marching out of every school in the city at a concerted hour. Thousands of circular letters addressed to citizens urging the necessity and pointing out the means of fire prevention were distributed. Settlements and philanthropic organizations distributed fire prevention "Don'ts" in English and Yiddish. Commissioner Adamson felt that the day was a landmark of the great progress made in fire prevention in New York during the past few years. The Bureau of Fire Prevention was organized in 1912. During the five years from 1912 through 1916 there was an annual average reduction of $1,581,916 in the city's fire loss. In other words, in five years the city was saved the substantial sum of $7,909,582. The record during the past three years has been even better, the average fire loss being $2,000,000 less than in the preceding three years and the average annual number of fires in buildings 1,000 less. The great feature of fire prevention activity during

the past year has been the work done in making factories safer. In October, 1916, the enforcement of the exit and occupancy law for factories was transferred from the state department of labor to the fire department. It is estimated that there was approximately 12,000 factory buildings in the city. From the beginning of the year to September 18, the fire department has made complete surveys of 3,900 of these factory buildings and by the first half of the year upwards of 15,000 violations had been noted. The great mass of work involved in the enforcement of the labor law had to be done by the fire department without an increase of force or additional fund. Commissioner Adamson did it by using New York's uniformed firemen. Every commander of the 301 fire companies in the city was made responsible for the factory buildings in his district. In districts where there were an unusually large number of factories, the work was done by a Central Building inspection squad composed of forty firemen selected for their knowledge of the law and of building construction. This squad made 510 complete surveys from July 20 to September 8.

Newark, N. J.—"Carelessness results in a half-million dollars' fire loss in Newark every year." These words were printed in large black letters on a card in the exhibit which was shown in the corridors on the third floor of the city hall in observance of Fire Prevention Day. "Think Fire—Before it Happens" was the wording on another sign. Captain C. Albert Gasser of the Bureau of Combustibles and Fire Risks, ran the exhibit for three days. Inspectors from the bureau cooperated with officials of the State department of labor in handling fire drills at various factories in the city. Many people visited the exhibit composed of pictures of fires and fire ruins and literature posted on screens. Most of the pictures were used in for-

Harrisburg, Pa.—Pennsylvania's fire loss is $25,000,000 annually, approximately $50 per minute, and fire marshal G. Chal Port impressed this on the public on Fire Prevention Day in every possible way. A proclamation issued by Governor Brumbaugh called upon every citizen of the state to observe the day by cleaning homes and buildings and destroying all rubbish, and it was very effective. In some municipalities special exercises were conducted in the school and in the fire houses. In Reading there were a number of elaborate features in the observance of the day. Thousands of copies of the governor's proclamation were distributed throughout the state. In addition ten thousand posters in bright colors were posted in every city, borough, town and hamlet. Fire marshal Port made a special appeal to farmers of the state to keep their premises clear of rubbish so that danger of the fire hazard in these war time be lessened. "The destruction of one barn filled with this season's bumper crops," he said, "means additional hardships for our fighting forces in France."

Sioux City, Ia.—Sioux City fire insurance agencies, in cooperation with the Commercial club, celebrated Fire Prevention Day in a really practical way. In former years, fire prevention day has never, in Sioux City, gotten further than a more or less scattered effort to "clean up" a few premises here and there. This year at least the business district received real attention. With experienced fire insurance agents as captains of 14 committees, other members also from the roster of the Commercial club, a survey of conditions in the business district was made and reported to the club. From this general investigation and report are expected to come valuable suggestions and recommendations from the Commercial club, which will result in material improvement in the fire hazards.

Two Big Fires in 24 Hours.

St. Paul, Minn.—Twenty firemen were overcome, temporarily blinded or injured, and property valued at more than $130,000 was destroyed when fire, undoubtedly of incendiary origin, destroyed the plant of the Twin City Hardwood Lumber company, and damaged the Twin City Varnish company's stock. The fire followed so closely one on the night before, which destroyed the H. B. Waite Lumber company buildings and yards which adjoined the Twin City Lumber company yards, that it was believed at first that sparks from this fire had started the second. But careful investigation of both fires caused the authorities to assert that there was no connection between them and that both were incendiary. Revised estimates of the damage to the Waite company caused the loss to ascend to $160,000, making the total loss within twenty-four hours to property in one square block reach nearly $300,000. A time bomb, carefully set and constructed, was believed by the police to have caused the Twin City company fire. Gasoline or some other highly inflammable substance was thought to have been used in the Waite fire. All the injured men suffered from the dense, sickening smoke which poured from the hardwood lumber. Repeatedly the men were drenched by streams of water as they struggled in the midst of solid walls of flames which shot fifty feet in the air. In addition, a strong wind which fanned the flames continually blew bitterly cold against the drenched men. Men were carried from the flames with their eyes closed by the heat and smoke. James J. Conway, district fire chief, who narrowly had escaped death by electrocution in the fire of the night before, was carried home overcome. James Mulcrone, captain of truck company No. 6, and his son, Emmett Mulcrone, a member of the same company, fought side by side, leaving the huge piles of blazing timber only for a fresh breath of air. Finally both collapsed and were taken home. Chief Devlin turned in a call for every available piece of fire apparatus in the city. Five minutes later nearly a block of lumber buildings was burning. Not one hundred feet from the fire was the Manhattan Oil company and two 50,000-gallon tanks filled with gasoline. Near by were other lumber yards, frame buildings and homes, all highly inflammable. Disregarding danger, the St. Paul firemen fought to save a conflagration which would have wiped out the entire district. Three leads of hose were placed across the St. Paul road tracks nearby. Traffic was held up until railroad men dug a trench under the tracks and placed the hose in them. Several sections of hose were burning up when firemen, caught in pockets, were dragged out by comrades who did not have time to save the hose. Minneapolis firemen helped fight the blaze.

Three Firemen Killed in Lodging House Blaze.

San Francisco, Cal.—Three firemen were killed and twenty others were injured by a falling mass of blazing timbers when a lodging house collapsed. The dead are: first assistant chief Stephen D. Russell, Joseph L. Allen, of engine No. 9, and Timothy Collins, truck company No. 1. Three minutes before the blazing walls buckled and crashed to the ground fire chief Thomas R. Murphy had ordered all his men from the three-story frame building. Thirty firemen stood in the vacant lot next the building, when, with a groan, it fell toward them. A few had time to stumble out of the falling mass, but the rest were caught. Firemen leaped over the hose and attacked the boards with their axes. A few crawled under, and their cries for help were added to those of the men within. Excited men yelled for the six ambulances, held a block away. Soldiers and sailors broke through the police lines and rushed to the pile of blazing debris. Then they began to take the men out through the hole they had cut in the boards. Dazed firemen, not badly hurt, but covered with mud and soot, came first. The men caught under the heavier load of falling timber were rescued last. "Responsibility for these deaths lies in the city's failure to condemn these flimsy firetraps," said chief Murphy, as he learned that three of his men had been killed. "Time after time we have asked them to condemn buildings like this, but they haven't done it." The lodging house and the storehouse were totally destroyed. The property loss was estimated at more than $50,000. Hundreds of tons of grain and feed owned by a number of persons and firms were destroyed by fire or ruined by water. Chief Russell was 60 years old and had been in the service many years. News that firemen had been killed reached the members of the Retail Dry Goods Association while they were holding their annual banquet. The association at once appropriated $500 for the relief of the families.

NEWS OF THE SOCIETIES

Calendar of Meetings.

Oct. 16-19.—LEAGUE OF KANSAS MUNICIPALITIES. Annual convention, Wichita, Kan. Secretary, Homer Talbot, University of Kansas, Lawrence, Kan.

Oct. 17-18.—LEAGUE OF MINNESOTA MUNICIPALITIES. Fifth annual convention, St. Cloud, Minn. Secretary-treasurer, Richard R. Price, University of Minnesota, Minneapolis.

Oct. 17-19.—AMERICAN PUBLIC HEALTH ASSOCIATION. Annual meeting, Washington, D. C. Acting Secretary, A. W. Hedrick, 126 Massachusetts Avenue, Boston, Mass.

Oct. 17-24.—AUSTRALIAN TOWN PLANNING CONFERENCE AND EXHIBITION, Adelaide, Australia. Organizing director, Charles C. Reade, government town planner, Education Buildings, Adelaide, South Australia.

Oct. 22-24.—AMERICAN CIVIC ASSOCIATION. Annual meeting, St. Louis, Mo. Secretary, Richard B. Watrous, 914 Union Trust building, Washington, D. C.

Oct. 28-30.—TEXAS CONFERENCE ON SOCIAL WELFARE. Annual convention, Houston, Texas.

Nov. 13.—NATIONAL TAX ASSOCIATION. Annual conference, Atlanta, Ga. Secretary, Fred R. Fairchild, Yale University, New Haven, Conn.

Nov. 14-16.—FIRE MARSHALS ASSOCIATION OF NORTH AMERICA. Annual convention, New Orleans, La. Secretary, W. M. Campbell, New Orleans, La.

Nov. 15-16.—ASSOCIATION OF URBAN UNIVERSITIES. Annual meeting, Pittsburgh, Pa. Secretary, Frederick B. Robinson, City College, New York, N. Y.

Nov. 19-24.—CITY MANAGERS' ASSOCIATION. Annual meeting, Detroit, Mich. Secretary, W. L. Miller, City Manager, St. Augustine, Fla.

Nov. 20-21.—ASSOCIATION OF GOVERNMENTAL RESEARCH AGENCIES. Third annnal meeting, Detroit, Mich. Secretary, C. O. Dustin, Statistical Bureau, Red Cross War Council, Washington, D. C.

Nov. 20-23.—PLAYGROUND AND RECREATION ASSOCIATION OF AMERICA. Recreation Congress. Secretary, H. S. Braucher, 1 Madison Ave., New York, N. Y.

Nov. 21-24.—NATIONAL MUNICIPAL LEAGUE. Twenty-third annual meeting, Hotel Statler, Detroit, Mich. Secretary, Clinton Rogers Woodruff, 703 North American Bldg., Philadelphia, Pa.

Jan. 3, 4.—NEW JERSEY STATE LEAGUE OF MUNICIPALITIES. Annual convention, Trenton, N. J. Secretary, Clinton A. Swartz, Trenton, N. J.

Jan. 15-17.—VIRGINIA GOOD ROADS ASSOCIATION. Seventh annual convention, Richmond, Va. Secretary, C. B. Scott, Richmond, Va.

Feb. 6-13.—FIRST CHICAGO CEMENT MACHINERY AND BUILDING SHOW. Supersedes annual Chicago Cement Show. Held at the Coliseum, under direction of the National Exhibition Co.

March 17-24.—PAN-AMERICAN CONGRESS ON CHILD WELFARE, Montevideo, Uruguay. Secretary, Edward N. Clopper, 105 East 22d Street, New York, N. Y.

Illinois Conference of Charities and Corrections.

An imposing list of speakers has been announced for the state conference of charities and corrections scheduled to open at Joliet Oct. 26, and continue to Oct. 28. In addition to Gov. Lowden, Mr. Hoyne and Judge Pam, many prominent educators, reform and charities workers are on the program.

Katherine Bement Davis, chairman of the New York parole commission; Senator Harold Kessinger; Miss Harriet Vittum; Dr. Herman M. Adler, state criminologist; Judge Victor Arnold, of the juvenile court of Cook county; Mrs. Gertrude Howe Britton, director of the Cook county bureau of social service; Miss Mary Bartemele, assistant judge of the Cook county juvenile Court; Dr. Kirchwey, former warden of Sing Sing prison; Prof. Robert Gault, of Northwestern University, editor of the American Journal of Criminal Law and Criminology; A. L. Bowen, state superintendent of charities; and other prominent men and women will also be speakers at the convention.

National Paving Brick Manufacturers' Association.

A general conference of the paving brick industry will be held in Cleveland, Ohio, November 19 and 20, 1917. All members of firms, board members of companies and other persons having financial interests in the business are invited and urged to attend this important meeting. The program for the meeting is under preparation, and this together with detailed information regarding the meeting will be sent all manufacturers of paving brick as soon as prepared.

League of Wisconsin Municipalities.

Mayor H. W. Adams of Beloit, was elected president of the League of Wisconsin Municipalities at the convention held at Chippewa Falls, Sept. 25-27. Mayor T. W. Thiesen of Racine, was elected vice-president and Ford H. McGregor, the present secretary-treasurer, was reelected to that office. The other officers recommended for election by the nominating committee, and elected by the convention follow: Board of Trustees—Mayor Daniel Hoan, Milwaukee; Mayor John Mulva, Oshkosh; Mayor Joseph Konkel, Superior; Mayor C. B. Clark, Neenah; Mayor H. W. Adams, Beloit. District Vice-Presidents—First, Mayor H. A. Runkel, Burlington; Second, Mayor John Kaiser, Port Washington; Third Mayor George Sayle, Madison; Fourth, Mayor Hans A. Koenig, Wauwatosa; Fifth, Senator Schultz, Milwaukee; Sixth, Mayor Hohensee, Fond du Lac; Seventh, Mayor A. A. Bentley, La Crosse; Eighth, Mayor H. E. Marquardt, Wausau; Ninth, Mayor Elmer Hall, Green Bay; Tenth, Mayor Geo. E. Dee, Chippewa Falls; Eleventh, Mayor Grant W. Clarke, Rhinelander.

The convention opened Wednesday afternoon with an address by Mayor T. W. Thiesen, Racine. Mayor Joseph Konkel, Superior, made the response. The president's address was given by Mayor C. B. Clark, Neenah. At the evening session an illustrated address on Milwaukee's new street lighting system was given by F. A. Vaughn, Milwaukee. A second illustrated lecture on bituminous pavements was given by John S. Crandall, New York.

On Thursday there were addresses by Dr. J. M. Furstman, La Crosse; Judge Charles D. Rosa, Beloit; H. G. Meigs, West Allis; Senator Ray P. Wilcox, Eau Claire, and Frank W. Lucas, Madison. The evening was given over to the address of Colonel Roosevelt on the war situation.

On Friday there were addresses by A. H. Melville, secretary of the State Council of Defense; M. J. Gillen, Racine; State Food Commissioner George J. Weigle, and Prof. J. L. Gillen of the university.

Michigan Conference of Charities and Corrections.

Arrangements for the Michigan state conference of charities and corrections to be held in Lansing, October 21, 22, 23, have been completed by the committees in charge. Speakers secured for the program hold nation-wide reputations and the topics will be of general community interest.

The opening meeting October 21 will be addressed by Dr. John G. Benson, of Detroit, who is the superintendent of social service, Detroit Area Methodist Episcopal church, and associated with social service at the Battle Creek cantonment.

Much ground will be covered in the addresses given between the hours of 9 a. m. and 12:15 Monday. Social aspects and health standpoints of the urban and rural conditions will be discussed by Dr. William DeKlein, Flint health officer; Miss Mary Marshall, of Battle Creek; Miss Edna Connor, of Cheboygan; Miss Blanche Post, of Grand Haven; Miss Mary McClure, of Kalamazoo, and Mrs. Henry Heering, of Grand Rapids. Dr. A. S. Warthin, of Ann Arbor, will address the meeting on the proposed program for control of general diseases in Michigan. Problems in care of the blind will be introduced by Roberta Griffith, of Grand Rapids, and Mrs. Eva Brewer Palmer, of Cleveland.

In the afternoon welfare of Michigan children will be discussed by Fred M. Butzel, William J. Norton and George J. Bedirger, all of Detroit.

At 4 p. m., Lansing institutions and other places of interest will be visited. A dinner will be served following the trip. Governor Albert E. Sleeper will preside over the evening meeting. Social aspects and war problems will be the topics considered by John B. Andrews, New York city, Miss Helen Y. Reid, director and convener of ladies' auxiliary of Canadian patriotic fund, Montreal, and T. J. Edmonds, acting director of civilian relief of the Chicago chapter of American Red Cross.

Community programs for social service as related to war conditions will be discussed Tuesday morning, under guidance of group leaders. T. J. Edmonds will again address the meeting on "Practical Programs for Civilian Relief of Red Cross." Miscellaneous problems will be treated by the following speakers: Judge C. B. Colling-

wood, Miss Marguerite Erikson, Lansing; Mrs. Lena P. Yax, of Jackson; Edith S. Reider, International Harvester company, Chicago; John G. Benson, Detroit; David A. Glascoff, Lansing; Harry L. Allen, Grand Rapids.

The final meeting will be held at the Michigan Agricultural College, Tuesday afternoon, following a luncheon at the Chamber of Commerce. Rural problems will be taken up by various professors. Speakers are as follows: Dr. Ward Giltner, bacteriology; E. C. Lindemann, Extension; T. H. Ryder, Economics, and field workers and students in attendance and in the employ of the college.

Montana Good Roads and Automobile Association.

The annual convention of this association was held at Helena, Sept. 28. Miles City was selected as the meeting place for the 1918 convention, and officers were elected as follows:

Oscar Rohn, of Butte, re-elected president. L. Newman, of Great Falls, first vice-president; Henry Goode, of Kalispell, second vice-president, and R. S. Phillips, of Butte, secretary. These officers, with A. L. Love, of Bozeman, V. S. Hymsel, of Plevna, R. B. Kelley, of Anaconda, and L. E. Carroll, of Roundup, constitute the board of directors.

Massachusetts State Firemen's Association.

Many interesting papers and addresses were presented at the annual convention of this association, which was held at Nahant Sept. 24 to 26. The president, William S. Smith, of Gloucester, opened the convention Wednesday afternoon.

Interesting papers were presented at the various meetings as follows:

Wednesday afternoon—"Bills affecting firemen considered by the Massachusetts legislature of 1917," Captain James F. McKissock, of Lowell.

"The value of inspection by members of fire department," Chief W. C. Shepard, Pittsfield.

"General description of the first fire department flying machines or flying apparatus which is a part of the equipment of the San Diego, Cal., fire department," Chief Louis Amgren, San Diego, Cal.

Evening—"Fire hazards in hospitals, public and private," William E. Holt, chief engineer state infirmary, Tewksbury.

"The practical working of the two platoon system," George F. Doyle, engine company 10, Boston.

Thursday—"The underwriters' views on the two platoon system," George W. Booth, chief engineer national board of fire underwriters, New York, N. Y.

"Speed limit of fire apparatus going to and returning from an alarm of fire," Louis N. Baudoin, Fairhaven.

"What a fireman who is selected to drive mo r apparatus or who is a candidate for chauffeur in fire departments should know and how best to procure the information," T. E. Flanagan, ladder company No. 4, Boston.

"Sprinklered risks," Paul Mason, fire prevention engineer, New York.

"Should firemen be detailed to theatres, moving picture shows and other places of amusement as a precautionary measure in the interest of fire prevention," John A. O'Keefe, fire prevention engineer, Boston Metropolitan district.

Evening session at 7.30—"The effect to firemen of a constitutional amendment providing for the initiative and referendum, also of the anti-sectarian and pensioned amendment to the bill of rights," George Frye Merrill, delegate to the constitutional convention, Gloucester.

Friday—"Story of the National Fire

(Continued on page 394.)

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

The state of Pennsylvania department of buildings and grounds is to construct a HIGHWAY BRIDGE to cost $195,000. The engineers for the work are Paxson & Morgan.

PAVING IMPROVEMENTS are to be made by Augusta, Kan., following the preparation of plans and specifications by the consulting engineering firm of Black and Veatch.

The WATERWORKS of Galena, Mo., are to be improved at a cost of $100,000. Plans and specifications for the improvement are being made by the firm of Burns & McDonnell.

An OUTFALL SEWERAGE SYSTEM is being built by Santa Barbara, Cal. The system was planned by the firm of Olmstead & Gillelen.

A SEWERAGE SYSTEM is to be constructed by Lind, Wash., plans for the work having been completed by the engineers, Sawyer Bros.

A SEWAGE DISPOSAL PLANT is to be built by Milton, Pa., plans for the improvement having been completed by the consulting engineer, Alexander Potter.

Pender, Neb., is building WATERWORKS and an ELECTRIC LIGHT PLANT. The engineers for the improvements are the Henningson Engineering Company.

Bristow, Okla., contemplates a number of STREET IMPROVEMENTS and extension to the SEWER and WATER SYSTEMS. The Benham Engineering Company has been retained to advise on these improvements.

Luzerne county, Wilkes-Barre, Pa., is to construct a VIADUCT. The consulting engineer on the project is David A. Keefe.

Columbia, Ill., is having plans for a municipal ELECTRIC PLANT prepared by the engineers, the Fuller-Coult Company.

Potococowa drainage district, Carrollton, Miss., is planning extensive RECLAMATION WORK. The Morgan Engineering Co. has been retained to make surveys and prepare plans.

A WATER TANK is to be built by Le Sueur Center, Minn., plans and specifications having being prepared by Earle D. Jackson, the consulting engineer.

Salem, N. J., is to install new pumping equipment in its WATERWORKS. Plans and specifications for the improvement were prepared by the engineer, William H. Boardman.

A SANITARY SEWER SYSTEM and DISPOSAL PLANT are to be constructed by Allentown, Pa., at a cost estimated at $1,500,000. New plans for the work have been started, the consulting engineer being Wm. H. Ennis.

Portsmouth, Va., is making an investigation of the WATER SUPPLY situation. The city has retained the Scofield Engineering Company to make a VALUATION of the property of the Portsmouth, Berkley and Suffolk Water Company and to make a SURVEY of the availability of possible sources and to report on qualities of water supplies.

PERSONALS

McAneny, Edward G., has been appointed Title Examiner for the city of Yonkers, N. Y.

Gardiner, William Gwynn, has been appointed a commissioner of the District of Columbia.

Hicks, L. G., has resigned as city engineer, of Roseburg, Ore.

Smith, Wm. M., head of the electrical department of Norfolk, Va., has resigned.

Bennett, M. O., division engineer of the Eastern Oregon Highway District, has resigned.

Palmer, W. K., head of the firm of W. K. Palmer Co., consulting engineers of Kansas City, Mo., has been commissioned a major in the engineer corps and will discontinue his practice for the period of the war.

Reese, L. R. P., has resigned as assistant city engineer of Fort Collins, Col., to attend the reserve officers' training camp.

Kurtz, F. E., has resigned as highway engineer of Jackson County, Ore.

Plumley, G. S., has opened an office at Charleston, W. Va., to engage in the practice of civil and mining engineering. For the past ten years Mr. Plumley has been chief engineer of the Blue Creek Coal and Land Co., and of the Kanawha & West Va. Railroad Co.

Keenan, John T., formerly assistant engineer of the Providence board of water supply, has been commissioned a major in the engineer reserve corps.

NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

SMITH WHEEL.

Of Special Metal Construction for Motor Vehicles.

European experience, especially marked during the war, has demonstrated to manufacturers and users many advantages of the metal wheel for motor vehicles, and the wooden wheel has over there been largely superseded. The metal wheel has been found practicable and economical in commercial vehicle service. Increased mileage of tires is a powerful reason given for the change. In all cases of using metal wheels many thousand miles have been added to the service of the tire, it is claimed. Increased gasoline mileage is also indicated by the data of actual practice. Unlike wooden wheels, it is said, metal wheels remain round and true, and do not change shape in taking and leaving the ground. Joints do not come loose in a metal wheel. These three conditions make for conservation of power in the case of the metal wheel. Smooth running also adds considerable strength and increased life to the truck itself.

These are the basic features emphasized in the design and construction of the Smith metal wheel. This is a light, one-piece metal wheel of hub, spoke and felloe type. It is hollow throughout, but internally reinforced with suitable braces which are so arranged as to distribute equally the stress of any load, strain or blow that can be applied from any angle. In making Smith wheels a metal alloy of great strength has been used. By special heat treatments the metal is made tough and elastic to the highest degree. The metal of which the wheel is constructed is 5-32 of an inch thick. As shown in the illustrations, a large number of internal braces connect the two outer walls, bracing them against each other. This construction is claimed to result in a wheel which is lighter than a wooden wheel of the same dimensions and much stronger. This superior strength is held to be due to the one-piece design itself; the employing throughout of the principle of curves, instead of many pieces with flat surfaces and sharp angles, thus eliminating starting points for giving way under strain; and to the toughness and resiliency of the metal as against wood.

SMITH WHEEL. REAR. OFFSET SPOKE TYPE. FOR DUAL OR LARGE SINGLE TIRE. SHOWING INTERNAL CONSTRUCTION.

The Smith wheel is made round and true, and the original shape is not distorted by length or severity of service. This quality makes for even wear on tires and tire manufacturers have asserted, after test, that tire mileage may be increased 40 per cent with the use of the Smith wheel. Again, it is claimed that heat from road friction is a great factor in rubber tire deterioration, wood being a non-conductor, and the solid felloe not giving the heat a chance to get away from the tire. In the case of the Smith wheel, however, it is asserted that the metal is a good conductor, and it has a hollow felloe and hollow spokes. With this air space and the numerous internal braces, the heat is quickly conducted away from the tire.

In wooden wheels the entire load is carried immediately under the ends of the spokes that stand directly below the axle. This forces the wooden felloe into a conical shape, with the diameter at the edge considerably less than at the spoke-bearing. The result is unequally distributed pressure on the tires, the pressure lessening as the outside of the felloe is neared. This causes greater tire wear, as a line that would cover the center of each spoke-end is approached, and at the end of every spoke the wear is still more accentuated, as the spoke does not yield. Because of the one-piece construction the load is equally applied to the spokes, both above and below the axle, and the fillets of the spoke at the felloe distribute the weight equally over the whole surface of the rubber. Because of this design and the

SMITH WHEEL FOR SINGLE TIRE. SHOWING INTERNAL CONSTRUCTION.

SMITH WHEEL. REAR. CENTRAL SPOKE TYPE. FOR DUAL OR LARGE SINGLE TIRE. SHOWING INTERNAL CONSTRUCTION.

consequent retaining of the shape of the wheel, the continuous even service and wear result in not using up excess power and gasoline. The avoidance of shocks and jars reduces wear on driving mechanism, and increases the life of the machine.

Moisture, drouth, heat, cold, heavy loading and grilling service do not affect the metal wheel, and contractors have found it particularly serviceable. The danger of collapse under strain is obviated. Painting and washing are simplified, and the appearance of the wheel is improved. The felloe is designed to take chains readily, and without being cut or splintered. Maintenance charges are eliminated.

Smith wheels are made for trucks of any size, and to fit any axle in any capacity. Two general types are made —with central spoke and with offset spoke, both of which are illustrated. Rear wheel and front wheel and single and dual designs are made. The wheels are made for use with solid tires only. The wheels are also furnished for either pressed-on or demountable tires as desired.

Laboratory tests under conditions more severe than those of actual service have been made to show the strength of the metal wheel. A load of 50,000 pounds was applied to a spoke section cut from a front Smith wheel. The tire would stand no more pressure, but in similar tests, with the spoke section resting on a wheel plate cut to the curve of the felloe, no signs of strain were apparent under a load of 43 tons. In another test a wheel, taking 40x6 dual tires, was cut in half to get it under the ram (reducing its normal resistance), and a steadily increasing pressure up to 50 tons was applied. The deflection of the arch between the spokes was increased by micrometer and in repeated tests the deflection was found to increase gradually from 0.002 of an inch at five tons to 0.033 at 50 tons—far within the elastic limits of the metal. In a third test the resistance of the wheel to dishing was demonstrated. With a 40x6 dual tire a load of 50 tons was applied to the section of the unsupported bare hub, with a resulting deflection of 1-32 of an inch. When the load was removed, the hub returned to its original position.

The accompanying illustrations show the construction of the single and dual tires, both the central and offset spoke types. The wheel described is made by Smith Wheel, Inc., Syracuse, N. Y.

MACON CONCRETE PAVING ROLLER.

For Compacting Surface and Removing Excess Water.

Among the methods of finishing concrete pavement which have received strong endorsement from prominent highway engineers is the use of a roller as practiced on concrete street paving in the city of Macon, Ga. This method was originated by Captain J. J. Gaillard, city engineer of Macon, and has so proved its advantages that its use is being widely followed elsewhere. Rollers of this type developed by Captain Gaillard have now been placed on the market.

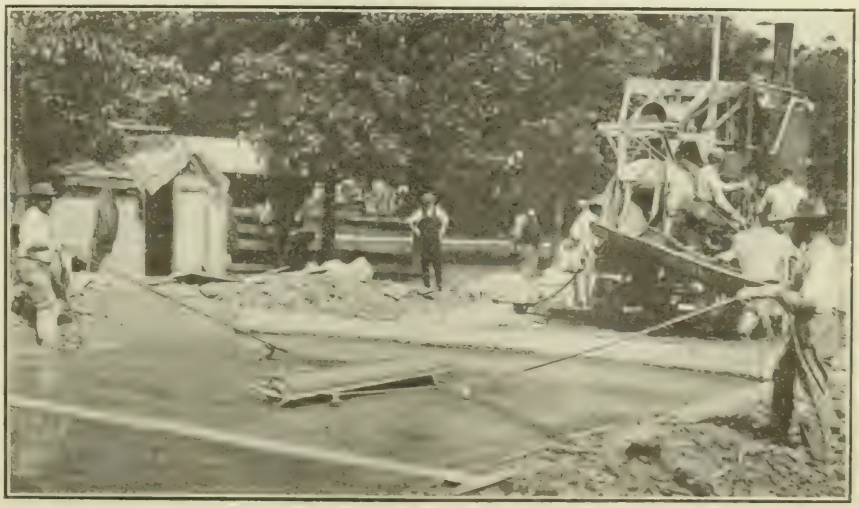
In concrete street or road construction for ease of manipulation it is necessary to use a little more water in the concrete mixture than is required for the greatest strength of concrete. Until the advent of the roller method, the objections to this excess quantity of water in the concrete could not be readily overcome, but with the roller finishing method developed by Captain Gaillard much of the excess water is removed from the concrete in the process of rolling, while at the same time the concrete is considerably compacted.

The result of using the roller was recently described by A. N. Johnson, consulting highway engineer of the Portland Cement Association. Mr. Johnson says: "The effect of the roller is that of a rolling squeegee. It consolidates the top layer of the concrete and removes practically all of the surplus water. At the same time it takes out the slight uneven places in the surfaces which may occur, particularly if the pavement has been struck by a template. The rolling should be continued until free water ceases to come to the surface."

Mr. Johnson also described "Tests of Concrete Slabs to Determine the effect of Removing Excess Water Used in Mixing," in a paper presented at the twentieth annual meeting of the American Society for Testing Materials. This paper was based on experiments made by finishing concrete slabs by a wood float and by the roller method. Tests were conducted at the Structural Materials Research Laboratory, Lewis Institute, Chicago, under the supervision of Mr. Johnson, and D. A. Abrams, professor in charge at the laboratory who collaborated in this work. The results of tests brought out the fact that slabs finished with the roller developed 20 per cent increase in strength over slabs merely hand finished. The appearance of broken slabs disclosed a marked difference between those finished with the roller and those finished with the hand float. The former had a distinctly denser appearance which extended for at least half the depth of the slab. Highway engineers have followed with interest the disclosures made by these recent tests, and have taken advantage of the ideas developed.

Since field operations in concrete highway work do not permit the use of a concrete of the most desirable consistency, with particular reference to the strength of the concrete, the roller method of finishing, which removes much of the excess water, is especially desirable. The cost of finishing is also greatly reduced and the result is claimed to be a better finish than can be obtained with either hand float or belt.

The Michigan State Highway Association, for instance, recently had ten rollers put on work in that State. The Macon concrete paving roller has been part put on the market by the Ransome Concrete Machinery Company, 115 Broadway, New York City.



MACON CONCRETE PAVING ROLLER ON THE JOB.

INDUSTRIAL NEWS

Cast Iron Pipe.—Prices remain at the same level after the big drop of $15 per ton on all sizes, announced last week. Since the Federal regulations are effective until Jan. 1, 1918, no further decrease is expected until then. It is expected that cities will begin asking for bids for future needs. Quotations: Chicago, 4-inch, class B and heavier, $53.50; 6-inch, $50.50. New York, 4-inch, class B and heavier, $53.50; 6-inch, $50.50. Birmingham, 4-inch, class B and heavier, $48; 6-inch, $45; class A, $1 extra.

Completion of United States Army Truck.—The following statement was given out by the automotive products section of the war industries board of the Council of National Defense: "Another war-time achievement of American engineering and manufacturing genius is disclosed in the completion of the first United States heavy-duty war truck. This truck, on the design of which the Quartermaster's Depart-

ment of the Army has been working since the 1st of August, was first completed at Lima, Ohio. Another truck was assembled in Rochester, N. Y., the next day, and started on the road. It is confidently believed that the United States war truck will prove to be one of the most valuable transportation factors yet developed for modern war. In its creation the Government has utilized the mechanical brains of the country best qualified for the job, with the result that the war truck was developed in little more than a month's time.

Both of the trucks referred to are the class B truck designed for a 3-ton load, but with capacity for 5 tons. The two trucks that have been assembled have exceeded the expectations of not only Brig. Gen. Chauncey B. Baker, of the Quartermaster's Department, which has directed the work, but also of the two score of engineers and hundreds of draftsmen who worked on the design in Washington. Early tests of the engine showed 58 horsepower at 1,350 revolutions per minute, and the engine torque curve is better than anticipated. It is felt that the United States heavy-duty war truck will go far to revolutionize army truck work so far as operation and maintenance are concerned, and that the truck will play a large part in affecting truck design in commercial circles.

That the War Department, as well as the members of the Society of Automotive Engineers who cooperated in the design work, are convinced that the truck is right, is shown by the fact that orders for 10,000 parts for the truck have already been placed, these orders including engines, axles and other parts. These orders have been widely placed over the industry, three or more different companies generally receiving orders for each of the different parts.

The work of speedy cooperation that characterized the production of the Liberty aviation engine has been equaled in the case of the war truck. In spite of the fact that a larger number of interests were involved in the building of the truck, making compromises in design more difficult, the great unanimity of feeling among those participating makes the result the more remarkable. Roughly, there were four major divisions of the engineering work, those relating to the engine, the transmission, the axles, and the other chassis parts. Each was manned by a corps of engineers. There were three, four and, in some cases, five different companies represented in the work on one unit, and it was naturally necessary for the engineers to subordinate all personal considerations to the end of achieving the very best known to the art. Each unit represents a composite of the best features contributed, rather than the work of any one individual. The engineer best qualified to design a certain part handled it in consultation with his fellow engineers.

In summarizing the cooperative talent embodied in the engine, it might be said that the crank case is Continental; the cylinders, Waukesha; the oiling system, a combination of Wisconsin and Buda; the pistons, Hercules; and the timing-gear system, a combination of Buda, Wisconsin and Continental. The governor is a combination of Kelly-Springfield and Waukesha. The cam shaft is a composite design. The engine has been designed with the thought of using the heavier fuels, the combustion chamber and other parts having been designed to meet these requirements.

What has been said of the engine can be said of the transmission, the axles and other parts. Three or four of the leading axle makers have worked together on the axle designs. So with the transmission.

So well have all of the engineers cooperated that the schedule set for the completion of the different truck units as well as of the completed truck, has been lived up to and generally improved upon. The first engines built in different factories were to have been delivered on September 30, and they were delivered on that date. The completed chassis was to have been ready October 10, and was ready on October 7.

The Nye Odorless Crematory Company, Georgia Casualty building, Macon, Ga., was awarded the contracts by the Government for the incinerators of all the army cantonments it could handle. Plants have been built from Massachusetts to Texas. Including three municipal plants, the company at one time had twelve different jobs under construction; this situation is considered by the company unique in the incinerator business.

Joseph T. Ryerson & Son have moved their Philadelphia office from 423 Commercial Trust Building to 1103 Widener Building.

Hendricks' Commercial Register for Buyers and Sellers.

The twenty-sixth annual edition of Hendricks' Commercial Register of the United States for Buyers and Sellers has just been published. The register has been found of great value to city purchasing agents, heads of departments, council committees and also contractors, and the new edition should prove as indispensible as those of former years. This standard publication is especially devoted to the interests of the architectural, contracting, electrical, engineering, hardware, iron, mechanical, mill, mining, quarrying, railroad, steel and kindred industries. Full lists are included of producers, manufacturers, dealers and consumers, listing all products, from the raw material to the finished article, together with the concerns handling these products, from the producer to the consumer. There are 2,209 pages of text matter, and the index to trade classifications numbers 151 pages, covering over 50,000 trade references. The list of trade names, brands, titles of identification, etc., numbering 1,212 pages, furnishes ready reference to distinctive products manufactured by concerns listed in the work. The alphabetical section is included for the first time, and contains in one alphabetical list the name, trade description and address of every concern appearing in the book. The volume is published by S. E. Hendricks Company, Inc., 2 W. 13th St., New York, at the city price of $10.00.

NEWS OF THE SOCIETIES

(Continued from page 391).

Protection association and how to describe the evidence of kerosene at incendiary fires," Secretary Franklin H. Wentworth, Boston.

"The advantages and disadvantages in the use of wire glass when fire occurs," Deputy Chief Daniel F. Sennot, Boston.

Ohio Conference of Charities and Corrections.

Columbus was picked for the 1918 convention of the Ohio state conference of Charities and Correction by the delegates who met in Springfield, Oct. 2-4. At the meeting Wednesday night the following officers were elected:

James L. Feiser, Cleveland, president; C. W. Hoffman, Cincinnati, first vice-president; Dr. Frances M. Hollingshed, Columbus, second vice-president; J. O. White, Cincinnati; the Rev. E. A. Coil, Marietta; W. H. Stoutt, Uhrichsville; the Rev. C. H. Leblond, Cleveland; Mrs. Pauline Steinem, Toledo; J. W. Wheeler, Columbus, executive committee.

Dixie-Overland Highway Association

At the annual convention of the Dixie-Overlaand Highway Association, held at Meridian, Miss., Sept. 6, officers were elected for the ensuing year as follows:

John S. Bleecker, Columbus, Ga., president, re-elected; Cliff Williams, Meridian, vice president at large.

Executive committee: John S. Bleecker, Columbus, Ga.; J. A. Waterman, Hawkinsville, Ga.; J. H. Drakeford, Tuskegee, Ala.; R. Curtis Jordan, Columbus, Ga.; Leland J. Henderson, Columbus, Ga.

State vice presidents: Georgia, W. A. Johnson, Savannah; Alabama, C. C. Clay, Demopolis; Mississippi, Frederick Sullens, Jackson; Louisiana, E. K. Smith, Shreveport; Texas, E. T. Peters, Dallas; New Mexico, Francis E. Laster, McSillea Park; Arizona, J. J. Bowman, Bisbee; California, Ed. Fletcher, San Diego.

Leland J. Henderson, Columbus, Ga., was re-elected secretary. County vice presidents for Alabama were named as follows:

D. W. Williams, Marvyn, Ala.; J. W. Maybury, Society Hill, Ala.; W. P. Dowling, Tuskegee; Geo. Wheeler, Montgomery; S. M. McCurdy, Jr., Lownesboro; Dudley Coleman, Uniontown; Allen Collins, Allenville; N. L. Lee, Demopolis; P. E. Jarman, Livingstown; A. J. Atkins, Selma; I. J. Moses, Girard, president; D. A. Floyd, Phoenix, vice president, state organization.

Municipal Journal

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NEW JERSEY CONCRETE ROAD CONSTRUCTION

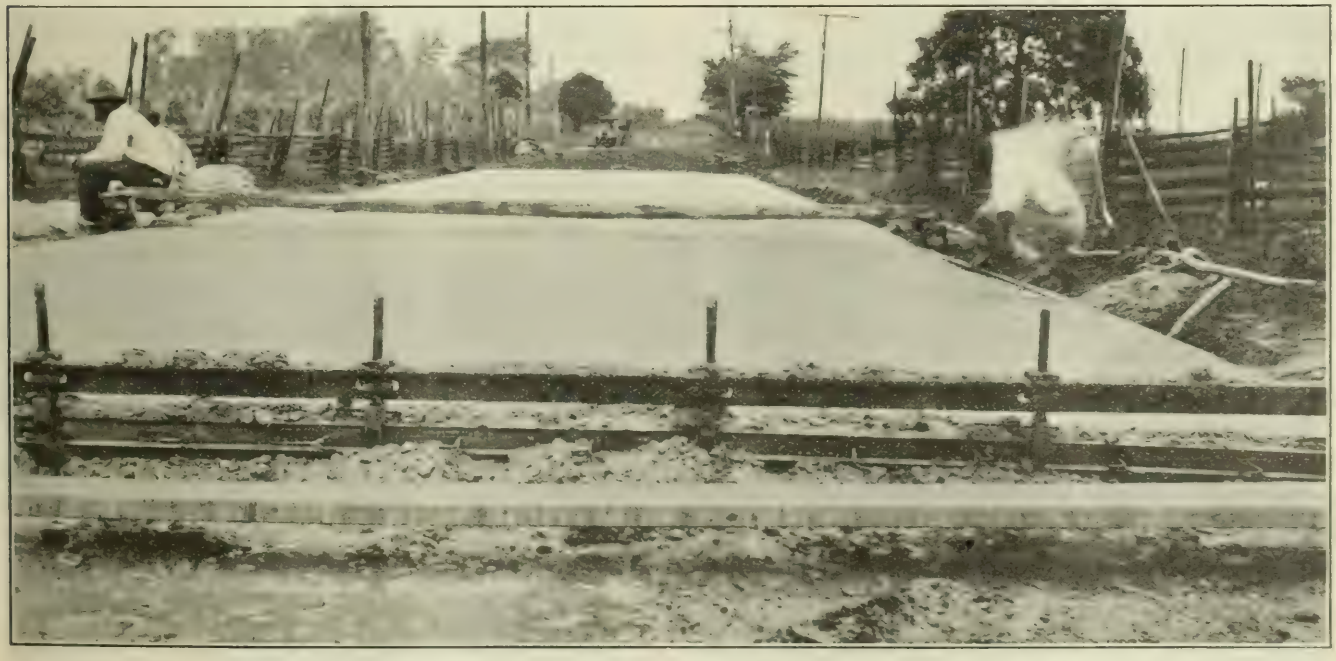
Reinforcing, Curb Protection Bars, and One-Two-Three Mix on Road Being Built to Carry Part of the Camp Dix Traffic—Surface-Finishing Concrete—Hauling Construction Materials.

Practically every construction detail possible to improve the pavement is being included in a concrete road now being constructed for Burlington County, New Jersey. This road is near Pemberton and is on one of the main routes leading into Camp Dix. In preparation for the heavy traffic that it will be called upon to carry, no expense is being spared in construction. The contract includes 12,880 sq. yds. of concrete pavement at $2.29 a yard. The road is of single-course concrete, 18 feet wide, 6 inches thick on the sides and 8 inches in the center. It is reinforced with Kahn road mesh, and Kahn curb protection bars are used to keep the edges from cracking or spalling. Carey Elastite joints, set in Kahn reinforced expansion joints are placed every 25 ft. The concrete is mixed 1:2:3. This rather high percentage of sand was necessary because of the uniform size of the gravel furnished for coarse aggregate.

The road on which the concrete surface is being built was an old dirt road, and in the reconstruction 3 or 4 inches was removed from the top in grading. No culverts had to be built and the grades, which were light, were left unchanged. All the work of preparing the subgrade was done by hand. For the most part the soil was easy to handle and, after loosening with a rooter plow, was brought to grade with shovels. A Buffalo Pitts steam roller was used to compact the subgrade in preparation for placing the concrete.

Sand and gravel are shipped in, the former from Absecon and the latter by the Penn Sand & Gravel Co. No attempt is made to unload the aggregate other than by hand, though there is an overhead coal dump at the station which could be rigged up for unloading aggregate without much trouble. Hauling is done by local teams, which are hired at $6 per day. The haul from the station to the job is slightly over a mile and the teams make 12 or 13 trips a day, working 9 hours. Six men are assigned for unloading the sand and gravel, 3 men working on a wagon. Small loads, generally about a yard, are carried and three men load a wagon in 2½ minutes.

The sand and gravel are dumped in parallel rows on the subgrade and transported to the mixer in barrows. The concreting gang comprises 26 to 28 men who are employed as follows: Four men placing concrete; two men on the striking board; one or two men finishing concrete; two men on cement; three men with barrows on gravel; two extra shovelers to help the gravel barrow men; two men on sand, each man filling his own barrow; two men on forms; a fireman; an engineer; a



JOINT INSTALLING DEVICE AND FINISHING BRIDGE. AT RIGHT, MAN INSTALLING CURB PROTECTION BAR.

EXPANSION JOINT (BEHIND LABORER) READY FOR INSTALLATION. IN FOREGROUND, EXPANSION JOINT IN PLACE; BEYOND THIS, END OF FLOATERS BRIDGE.

foreman, and a couple of general utility men. A Koehring No. 16 mixer is used. Two bags of cement, two barrows of sand and three of gravel make one charge.

The forms are of 6-inch channel iron cut into sections 10 feet long for convenience in handling. These are held in place by iron pins or stakes driven into the subgrade. The Kahn reinforcing is placed about 3½ inches from the bottom. Expansion joints are constructed at 25-ft. intervals. The curb protection bars are put in place after the concrete has been placed and brought to the proper surface, but before any set has taken place. The concrete is mixed rather dry and the subgrade is thoroughly wet before placing. The final treatment is given with a wood float, which leaves a rather rough surface with the sand grains on top. An earth covering protects the concrete for the 10 days necessary for curing.

Water is secured from the Pemberton water supply system and is carried through about 6,000 ft. of 3-inch pipe. Plugged tees are placed about 200 ft. apart for hose connections. Enough pressure is secured from the Pemberton supply so that no auxiliary pumping is needed.

The road is being built by The Utility Construction Co. of New Brunswick for Burlington County. James Logan is county engineer and in charge of all road work done by the county. F. Yocum is supervising engineer for the Portland Cement Association, which furnishes an engineer to see that all construction details which may have a bearing on the quality of the concrete are given proper attention.

SAND ROAD EXPERIMENTS IN WISCONSIN.

By H. J. KUELLING.*

Under the new state trunk highway law of Wisconsin the Wisconsin Highway Commission found itself with the problem of looking after the maintenance of about 700 miles of almost pure sand roads. These roads were of such a nature that many of them were impassable in dry weather, and often in wet weather owing to the sand becoming quick. In other words, these roads were in bad condition a considerable share of the summer and part of the spring season.

In times past many of the local communities had placed a covering of clay on these roads where any clay was available. Still other communities had placed some straw or hay on the traveled section, but this was always quite temporary, as the hay was soon ground to pieces or rotted away.

Mr. Hirst, the state highway engineer, conceived the idea of making a mat of hay and tar, which would have some strength within itself and also be able to withstand the elements.

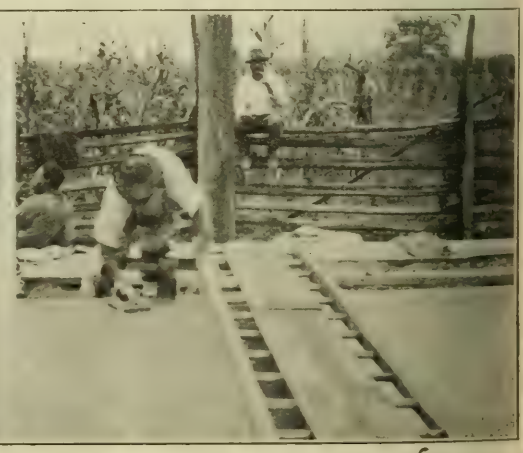
With this end in view the State Highway Department constructed a few short sections built in various manners in the month of August, 1917. After about six weeks' wear the condition of some of these sections was satisfactory enough to warrant the construction of a longer experiment. This latter piece was built during the first week of October and is somewhat over a mile in length.

No particular merits are claimed as yet for this type of construction, but it will be watched with a great deal of interest by the engineers of the department and the various local people who live in the sand sections of the state.

The experimental road was constructed about as follows:

*Assistant to State Highway Engineer of Wisconsin.

EXPANSION JOINT IN PLACE.



FINISHING WITH WOOD FLOAT.

The road was first staked out as to alignment. A furrow was then plowed on each side of the road in order to hold the grader somewhat true to line, one team being able to accomplish this. After the plowing had been done, two teams were hitched to a small road grader, and after several trips up and down the road a reasonably good trench was constructed.

The road had previously been divided into twelve sections, which were constructed as follows:

Section No. 1. This section is 1,000 feet long and 16 feet wide. It is one of two sections that contain an appreciable grade, at one point about 200 feet of 8 per cent. This particular hill has been a bugaboo for tourists for several years, and especially during the past season, because of the fact that this road is the main road from Portage to Kilbourn and thence on to Camp Douglas, where the Wisconsin troops have been in camp.

This section was covered with a layer of marsh hay, after which it was given about ½ gallon treatment of Tarvia "B" applied cold. A second layer of hay was then applied and slightly over a ½ gallon treatment given. The section on the steep hill was given a considerably larger treatment of tar than the flatter sections. After the last application of tar, sand from the roadside was spread by shovels over the entire section to a depth of about 1 inch. The hay used on this section, as well as on each of the other sections, was spread so that a ton covered about 350 square yards.

Section No. 2. This section is about 1,000 feet long and 9 feet wide. After the trench was constructed, a layer of hay was placed and given about a ½ gallon treatment of Tarvia. This layer of hay contained about ½ the hay that was applied on the section. One-half of the remaining amount of hay was added and given a ¼ gallon treatment of tar. The remainder of the hay was then added in a third layer and this also given a ¼ gallon treatment of tar. The section was then covered with about one inch of sand from the roadside.

Section No. 3. This section is 200 feet long and 9 feet wide. It was short because of the fact that rye straw was used and it was almost impossible to obtain such straw, as the farmers did not care to sell it.

The straw was placed on this section in the same manner as hay had been placed on the previous section, and in the same quantity as to volume but, of course, not as to weight, a ton of straw going much farther than a ton of hay. The straw was divided into two layers, each one receiving a half gallon treatment of tar. The whole section was then covered with about one inch of sand from the roadside.

Section No. 4. This section was 1,000 feet long and 9 feet wide. The first layer of marsh hay was placed and, without having received any treatment of tar, was covered with about one inch of sand from the roadside. The remainder of the hay was then added and given a ½ gallon treatment of tar. This was followed with about one inch of sand from the roadside.

The subgrade conditions on this section varied quite considerably, as the central part of the section had a harder subsoil than most of the road. The two ends, however, were exceedingly soft sand. This section appeared to be somewhat easier to construct than the other tarred sections, owing to the heavy oiler not making as great a rut in the subgrade.

Section No. 5. This section was 500 feet long and 9 feet wide. It consisted of two layers of hay, each of which was given a ¼ gallon treatment of tar. The second layer of hay on this section was extra heavy and caused considerable trouble by getting into the gears of the oiler. This section also was covered with about one inch of sand from the roadside.

Section No. 6. This section was 500 feet long and 9 feet wide. The entire amount of hay was put on at once and given a ¾ gallon treatment of tar, after which the section was covered with about one inch of sand from the roadside.

The above six sections were the only ones in which the tar and hay were used together. Considerable trouble was had at first in getting the tar properly applied, owing to the fact that the weather was fairly cool. To overcome this, the tank car was heated, after which the sprayers on the oiler worked very satisfactorily, giving an almost uniform coating of ¼ of a gallon per square yard.

Section No. 7. This section was 500 feet long and 9 feet wide. A layer of marsh hay was placed and covered with about one inch of local sand. The remainder of the hay was put on and also covered with about one inch of local sand, after which the road was thrown open to traffic.

Section No. 8. This section was 150 feet long and 9 feet wide. A layer of rye straw was placed and covered with about one inch of sand. This straw was in poor condition because of the fact that it was from the 1916 crop. A second layer of the same kind and amount of straw was placed and also covered with about one inch of local sand.

Section No. 9. This section is 100 feet long and 9 feet wide. The full computed amount of straw was placed in one layer and covered with about one inch of sand from the roadside.

Section No. 10. This section was 550 feet long and 9 feet wide. The full computed amount of hay was placed in one layer and covered with about one inch of local sand.

Section No. 11. This section was about 300 feet long and 10 feet wide. Owing to the fact that a great many local people believed that tar alone would be beneficial, this section consisted of about one gallon of tar placed directly upon the roadbed. No particular good is expected to result from this and it was constructed somewhat to show what not to do.

Section No. 12. This section consisted of two pieces about 300 feet long. On this section no trench was made and the hay was merely deposited on top of the sandy road, as the local people had been doing for several years. These sections were not given any treatment of sand from the roadside.

The cost of the entire experiment consisted of $7.00 worth of rye straw purchased at $6 per ton, and $156 worth of marsh hay purchased at $8 per ton delivered on the road. The cost of labor and teams was $216 and the cost of the tar $322, making a total of $701 for the construction of 4,977 square yards which were treated with Tarvia to the extent of from ½ gallon to somewhat over a gallon per square yard, and the 1,900 square yards which did not receive any Tarvia treatment.

It is not anticipated by the State Highway Commission that all of these sections will be an economic success. However, if a method is arrived at by which these sand roads can be made passable at reasonable cost the commission will be satisfied. If the section that is now

SANDY ROAD BEING TREATED WITH HAY AND BITUMEN.

two months old, built in a similar manner, is any criterion, traffic will be well pleased with this type of road. On this section in question there is a very well compacted mat formed which is carrying the traffic in a very satisfactory manner.

As stated by the writer, this experiment will be watched with a great deal of interest, and at some future date the Commission will be glad to publish a description of the condition of the road and what they believe concerning it.

MACHINERY IN MACADAM CONSTRUCTION

Used to Meet Requirements of Ohio State Highway Specifications and for Economy—Graders, Roller, Tractor, Unloader, Stone Spreader.

The following article is a description of the use of machinery in the construction of a macadam road according to the Ohio specifications by Theodore Vogelsberg of London, Ohio. This road is six miles west of Columbus and extends for a little over a mile north from the National road.

The specifications required that the material removed in grading be used in fills and in making berms. For this work the contractor uses a Huber steam tractor with three dumping trailers. He states that with these, on level roads, he does for 10c. per cubic yard work that would require 44 teams and cost 75c. per cubic yard. In addition he has three Blair trucks which can be used for the same service as well as for carrying their own loads when conditions are right or in case of necessity.

It is required that a road grader be run over the completed grade until it is uniformly crowned and this means, in an ordinary contract for macadamizing, that most of the work is done with a road machine. On this contract the work is done with an Adams "Road King" and an Austin grader for the heavier work, and an Ohio "Leader" for light work and for spreading stone. On one of this year's contracts where no grading was necessary, this contractor did all the shaping of the subgrade with an Ohio Leader.

Following the shaping, the sub-grade must be rolled with a self-propelled roller of at least 10 tons. In this contract a Kelly 14-ton steam roller is used.

It is required that the ditches alongside the completed grade be finished by hand labor, and three laborers are used in this work, placing on the berms the earth so removed. A special ditching and shaping machine could do this work much more quickly and leave the berm in better shape and with a smoother surface. Although the straight-edge and hand-level provided for in the specifications has not been used, the grade was in good shape, uniform, smooth and regular.

Upon this sub-grade is placed 9 inches of 2½-inch to 4-inch crushed limestone in two layers. For the first layer, side-boards 5 inches high are staked in place 16 ft. apart, to fix the thickness of the layer. Cubical blocks 5 inches thick are specified for the center of the road, but are not always used.

For unloading the stone from cars, this contractor uses a Galion unloader operated by a gasoline engine. He reports that 15 to 18 shovelers were required to unload a car at a cost of about $7.00, but the unloader does the work at a cost of 50c a car. One of the machines cost $750 and paid for itself in 30 days by the saving in labor alone. One or two men are required to operate it, making a saving of 12 to 15 men. When the stone is hauled direct from the crusher, an unloader, of course, is not required.

It would seem as though motor trucks would be necessary to get the full benefit of the unloader, but this contractor's experience with motor trucks has not been very favorable, which he attributes mainly to bad management and carelessness of chauffeurs, instancing a repair bill of $781 in 60 days on three trucks as evidence of this. Also he believes that a 5-ton truck is too large for this kind of work and that 3 or 3½-ton trucks would give better results. He believes that he could run these smaller trucks with an overload the few times when he would need to do so with less expense for repairs than he is paying now. Possibly his operating expense would be somewhat less also. These trucks, end-dump, were dumping stone across the roadway, within the middle 10 ft. or so of the road, making a more or less pronounced ridge along the center line. Instead of spreading this stone by means of the stone spreader, he used a rake operated by two men, one pulling on the rake handle and the other pushing on a handle hooked in from the opposite direction. There was a tendency, in drawing the stone out to meet the top of the side-boards, to make the layer a little thin in the outer quarters and leave it correspondingly thick in the center. After the berm is filled in even with the side-boards, they are removed and the road roller is run along the berm and edge of the stone several times and then worked gradually toward the center, the rolling being continued until the stone ceases to creep in front of the roller and the surface is true to line and grade, all irregularities and depressions being filled with stone.

On this layer are spread stone screenings in sufficient quantity to fill all the voids in this lower course and no more. These are thoroughly rolled in dry, then wet and re-rolled and more screenings added until the layer is thoroughly bonded, water being supplied in sufficient quantity to produce this result but not enough to saturate the sub-grade. The stone screenings are dumped along the roadside and distributed from there, as no hauling is permitted over the crushed stone layer until it is water-bound. It would seem that, with motor-trucks following up the spreading of the stone closely with the stone dust, it should be possible to distribute the stone dust directly on the road from the tail of the truck and thus save some 10c a ton in the spreading, besides any saving there may be in truck hauling over team hauling.

The water supply was obtained by putting a gasoline-driven pump in a convenient well and distributing the water by a 1½-inch pipe laid along the road fence with hose connections at frequent intervals. The pipe extends about half the length of the road and saves one team costing about $4.50 a day, costs less to run and nothing when water is not being used. The contractor has a 600-gallon Studebaker water tank to supply water to steam engines and truck radiators and for binding the road should the pipe supply not be available at any place.

The second layer of stone, 4 inches thick, is placed in the same manner as the first, and the sprinkling and addition of screenings and the rolling are continued until grout has been formed on the surface which fills all voids in the stone and forms a wave ahead of the roller. The road is then allowed to dry and, if found necessary, receives additional sprinkling and rolling. To aid in forcing the screenings into the voids of the stone, stiff brooms are used behind the roller to loosen the mat formed on the surface. Two men are required for this work if it is done with hand brooms, but these men are eliminated if brooms attached to the rear of the roller are used.

The small number of men at work on this road was notable. Three truck chauffeurs (visible one at a time),

three men unloading and spreading stone, one man handling the water and helping where needed, and one man on the steam roller, took care of the stone layer. One man on the small grader, the steam roller man and three men finishing ditches and digging culverts and the concrete head walls for them, took care of the grade and drainage. One cook and one foreman completed the regular force. When the gang is short handed the work can be done in sections with about two-thirds this force in about twice the time, while, if labor is plenty, the addition of a few men may hasten the completion of the work proportionately.

SEWAGE PUMPING IN CHARLESTON.

In connection with the 47 miles of sewers in Charleston, S. C., varying from 8 to 24 inches in diameter, there are nine pumping plants. Of these, eight are electrically driven centrifugal pumps of capacities varying from 500 gallons per minute to 1,400 gallons per minute. They are driven by electric motors that vary from 10 h. p. to 20 h. p., using 110 volt, 60 cycle, single phase, alternating current, which is purchased from the railway and lighting company. The ninth pumping station is operated by compressed air, Shone ejectors being employed.

The pumping stations have worked satisfactorily during the year, although the pumps have been choked at times by materials which householders should not have deposited in the sewers, such as pieces of broomsticks, bones, and complete articles of wearing apparel.

At two of the pumping stations, because of the fact that all of the appurtenances are under ground and it is impossible to thoroughly ventilate the plant and keep it dry, the electrical equipment has suffered. This, it was believed, could be remedied by extending the brick work of the pump pits (which are circular in plan) 8 or 10 feet above the ground, thereby permitting improved ventilating conditions and removing the electrical apparatus to the ground level, where it will not be affected by the dampness of the pits.

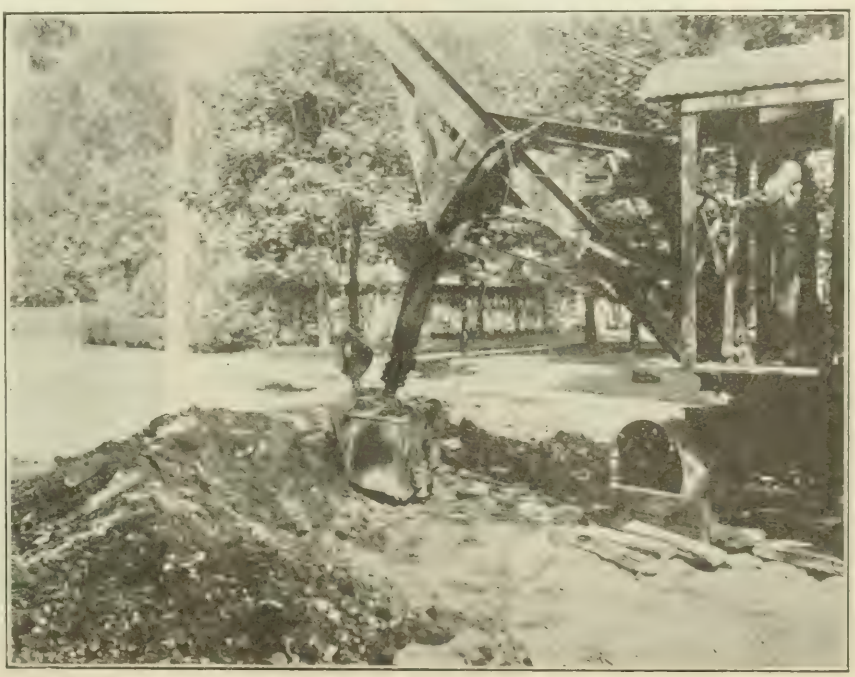
The cost of operating these plants during the year was $2,553, of which $2,336 was for current, $132.50 for supplies and miscellaneous, and the remainder for ball bearings, grease and minor supplies.

STEAM SHOVEL IN STREET EXCAVATING.

In Ridgewood, N. J., a new pavement is under construction in Godwin avenue, the old macadam being taken up to be replaced with warrenite. At present the contractor (The Union Building & Construction Co., of Passaic) is engaged in excavating the old pavement and in this work is using a steam shovel. The width of roadway between curbs is 26 feet and the excavation will average about 6 or 8 inches for this entire width. The contractor excavates for a depth of about 15 inches through the center of the roadway, but leaves a bench several feet wide along each side, which bench is later moved by hand into the center of the road and used for putting the finishing surface to the sub-grade, after which the entire width of the roadway is rolled.

The shovel used is a Thew, Type "O." It travels on a track composed of 4-inch by 10-inch oak planks resting on 3-inch by 9-inch by 3-ft. oak ties placed 18 inches between centers. The shovel crew consists of an operator, a fireman and two laborers. Seven teams are employed. This force averages 240 cu. yds. a day of excavation in a hard soil containing a considerable number of stones running up to 18 or 24 inches diameter.

The sub-grade is then furrowed and rolled by a force consisting of 7 laborers, a sub-foreman and a steam roller run by a roller operator.



REMOVING MACADAM WITH STEAM SHOVEL IN RIDGEWOOD.

HOUSE CONNECTIONS PRELIMINARY TO PAVING.

We believe there can be no question of the soundness of the argument advanced by Mr. Brewer in the letter below against the constructing of the roadway section of a sewer connection before it is known where the house end of the connection is to come. Whether this and other arguments against this practice are more than balanced by those in favor of it from the point of view of the paving department is a question of the greatest importance that has not received sufficient consideration in most cities.

Waltham, Mass., October 18, 1917

Editor Municipal Journal, New York.

Dear Sir:—

I notice your editorial "Placing House Connections Ahead of Paving," and the arguments mentioned pro and con. It seems not to take into account one of the most essential, perhaps the most essential, elements in satisfactory house connection work, viz.—the need of straight lines and grades from the house to the main pipe. Anyone having several years' experience in maintaining a sewer or water system knows the advantages in straight lines and grades when the inevitable stoppages occur in the connections. Theoretically it might be possible to lay a part of a connection at one time and extend it on the same grade and line at another time when a building is erected, but practically it is impossible to do so in America. It might be in Germany before the war. It is a question whether it will be possible there after the war. We mean by this that, to get such results, it would require almost unlimited authority, more technical training, executive ability and continuity of service than American cities require.

Of course, if the straight lines and grades are not considered necessary, there is no argument. We believe they are. We have never found cleaning apparatus to work well except in well aligned connections, and believe that the prospective builder and official in charge have some reason for the right to insist on connections being put in entire at one time, by one party, straight and true throughout to the point where the owner wants them to enter the building.

We thoroughly indorse all you have to say about backfilling. We believe, however, that the whole connection should go in at one time. In Waltham, Mass., by placing several departments under one head, much money has been saved in the last two years by putting water, sewer

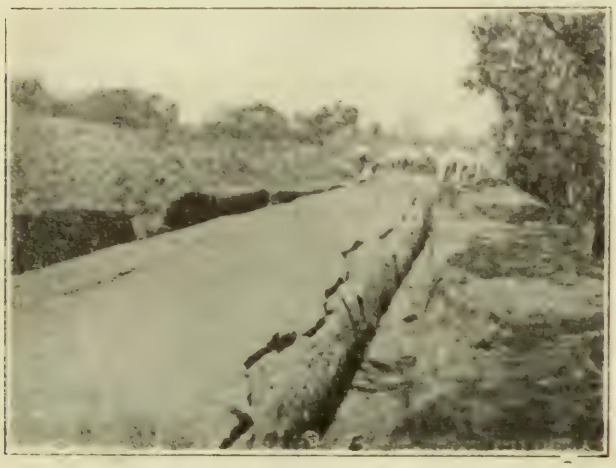
and drain connections in one ditch. Not only has the good alignment been secured, but the street excavation has been confined to one narrow trench. When a street is to be repaved a canvass of property owners is made and, as far as possible, new connections are constructed, old ones examined and, if necessary, repaired or renewed.

Yours very truly,
BERTRAM BREWER.

City Engineer, Supt. Water Works & Sewers, Waltham, Mass.

FAILURE OF BRICK SEWER.

A brick sewer in Albany, N. Y., known as the Beaver Creek sewer has had to be repaired and in many sections entirely replaced because of a partial or total collapse of its arch. This old sewer was 7 ft. in diameter and circular in section and when uncovered was found



LONGITUDINAL CRACKS IN SEVEN-FOOT CIRCULAR BRICK SEWER IN ALBANY.

to have three longitudinal cracks throughout its length, one at the top of the arch where it had settled, and one through each quarter-line of the arch where the haunches had bulged out. The photograph shows these cracks quite plainly and illustrates the manner in which sewer arches tend to fail. The cause of this settling of the arch was not stated, but the sewer was only two rings thick, which would seem to be inadequate for a sewer of such diameter.

OPERATION OF SEWAGE TREATMENT PLANTS.

In the issue of Municipal Journal of November 30, 1916, we published an abstract of the report of the Committee on Sewage Works Operation and Analytical Methods of the American Public Health Association, in which the importance of analytical tests and proper supervision of plants was emphasized and a list was given of analytical tests proposed by the committee. Approval of this (as of other reports to the association) was withheld until this year in order that it might be printed in the journal and opportunity be given for study and examination of it.

On October 18th this committee presented a report which repeated the recommendations of the 1916 report, which was adopted by the Sanitary Engineering Section of the association. In this year's report the committee presented an amplification of one of the minor details of the 1916 report, in response to a request made last year. No other matter was presented, owing to war conditions, one of which was the absence on service in France of Paul Hansen, a member of the committee.

The detail amplified was the recommendation concerning state control over the operation of sewage treatment works. The varying degrees of state control were classified by the committee as: (1) No control at all. Unworthy of discussion; (2) Inspection on complaint, followed by general advice. Better than 1, but when non-technical citizens complain, conditions may have reached the point where the remedy will be difficult and expensive and public health be endangered; (3) Routine inspection and advice wherever deemed advisable and necessary by the state department; (4) Routine inspection as in No. 3, and also general supervision and control of operation; (5) Extension of duties outlined in Nos. 3 and 4 and authority to require the proper operation with adequate police powers to enforce the proper operation on the part of the municipality or owner and authority to require the maintenance of regular routine tests and records. The powers suggested in Nos. 3, 4 and 5 are exercised to a greater or less extent by 15 states containing 60 per cent of the population of the country. No. 5 is considered by the committee to be the most desirable of these three. One of the chief arguments for central control is the failure of many municipalities to recognize the need for expert advice and trained employes in the operation of sewage treatment works. (6) The actual operation of sewage treatment works by the state board of health. This is not recommended.

BURNING OFF A STANDPIPE.

A standpipe 65 ft. high in Grand Rapids, Mich., has been standing empty and out of service for at least 10 years and was recently bought in as old metal by a junk-dealer, who made a bid for the same which was attractive to the city officials. In removing it, two men with oxy-acetylene torches burned through the steel shell at the base, and three men pulling on a rope attached to the top drew the standpipe down to the ground. Hundreds of persons had gathered to witness the fall of the standpipe, which had been a land mark for a number of years. It contained about 114 tons of iron, was 1 inch thick at the bottom ring, and had a capacity of 400,000 gallons.

STANDPIPE PULLED OVER AFTER CUTTING OFF AT BOTTOM WITH OXYGEN TORCH.

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Subscribers are requested to notify us of changes of address, giving both old and new addresses.

Contributed Articles and Reports.

Contributions suitable for this paper, either in the form of special articles or as letters discussing municipal matters, are invited and paid for.

City officials and civic organizations are particularly requested to send Municipal Journal regularly their annual and special reports.

Information Bureau.

Municipal Journal's Information Bureau, developed by twenty-one years' research and practical experience in its special field, is at the command of our subscribers at all times and without charge.

SINKING FUNDS FOR LIBERTY BONDS.

Detroit's Sinking Fund Commission is taking $250,000 of the second Liberty Loan and as much of a second $250,000 as is not taken by the city employees. A captain will be named in each city department to canvass the employees of that department. There are 10,000 employees, including day laborers, and the mayor's secretary, who has charge of the campaign, anticipates no difficulty in disposing of that amount or more of bonds among them.

Detroit has a population of 600,000 and about $7,000,000 in the sinking fund. She will therefore have 4 to 7 per cent of her sinking funds in Liberty Bonds, or about 50c per capita. Why should not all cities follow the example set by Boston, Detroit and others?

SPECIAL FIRE PREVENTION NUMBER.

We had intended, as announced, to devote this issue of Municipal Journal to matters of interest to Fire Departments, and have collected a greater amount of information on the subject than we have ever done before, which means more than has ever before been collected by any one in this country. It has seemed best, however, to postpone this special issue until November 8th, partly because a number of fire chiefs have delayed sending in the information asked for and additional reports are coming in by every mail, and partly because more time is required for the proper tabulating of the tens of thousands of items of information furnished.

In preparing this issue a special feature is being made of fire prevention, which is a most important factor in the conservation which the war demands of every individual and organization in the country. As a single illustration of this, fires have destroyed several million dollars' worth of food materials in the United States within a week prior to the writing of this, and the food that we can furnish to ourselves and our allies during the next few months is fully as important as the ammunition that we can turn out. What is being done in the matter of fire prevention, and how, is, therefore, a matter of vital interest to everyone in the country, and not to fire departments only.

DRAUGHTSMEN AND MECHANICS WANTED.

Draughtsmen who are good letterers, mappers, men who can take blueprints and photographers; surveyors; pipe caulkers and lead furnace men; experienced well drillers; machinists and pipe fitters; steam and gas engine runners; masons and concrete workers; skilled mechanics for repairing autos; electricians, riggers, blasters and powder men are needed in the army, especially by the 26th Engineers, a specialized organization destined for water supply service and to operate repair shops in France. A most patriotic duty will be done by any one who can help to fill these positions, either by enlisting himself or by urging that this be done by others who can perform such services satisfactorily.

The work referred to will have to be done by some one. If competent men are not available for it, those in charge will have to use incompetent ones on the work. Making war today is largely a matter of machinery, not only back home but also at the front. If the commander cannot get competent men to keep the machinery in shape, and the automobiles, tanks, aeroplanes, etc., fail, and a drive loses its "punch" thereby, who will be most to blame, those in command "over there" or those back home who failed to provide him with competent men?

Turn back to the June 14th and June 28th issues of Municipal Journal and read of the conditions under which the British Army lived in France, and remember that before six months are over a million of the very best men of America will be living and fighting in that country. Think how necessary it is that they be given the best sanitary service possible (the best possible will be none too good)—safe water to drink and sanitary sewerage and refuse disposal at every point from the first landing on French soil up to the very firing line. Can not your city spare the services of yourself or of some of your assistants more readily than can our boys in France and the cause of our allies and of world democracy?

INDEXING BY LIBRARIES.

A bibliography or list of books and articles should be, it seems to us, prepared with a view to enabling those interested in any particular subject to learn what has been published concerning it, and this with the least time and effort. To effect this requires that the party preparing the list of books and articles should classify them in the way that will most effectively secure this readiness of reference.

Many libraries prepare such lists, and in doing so arrange the subjects under various heads, which heads are generally well chosen. But there are, in most cases, from a score to a hundred or more individual books and articles under each head, and these also they arrange; but the method of arrangement adopted by most libraries seems to us to be so ineffective of the result supposedly aimed at that it is really worse than none at all. An illustration is taken from a bibliography issued by one of the largest libraries of the country. In this each book and article is described by giving the title with the first

word in black-face type, presumably with the idea that such word would catch the eye and assist in locating the articles desired. Under the head "Septic Tank Treatment" we find the following black-face first words: "Automatic," "Cameron," "Proper," "Review," "Septic" (seventeen times), "Sewage" (three times), "Champaign," "Decision," "Experimental," "Proposed," "Purification," "Recent," "Regulations," "Sewage," and "Treatment." About three or four times as many more articles are given under the name of the author, in one case the title "Professor" preceding the name, being the only black-face word in the entire item. The title of each article was given just as it was published, without any rearrangement, and such titles were arranged alphabetically according to the first words, and these words made prominent by black-face type.

What possible aid to the investigator of some particular phase of septic tank purification is it to know that the title of an article dealing with septic tank purification begins with the word "Septic," or "Sewage," or "Recent," or "Treatment"? Or that it was written by a Professor? When this plan of arrangement has been followed, the only thing to do is to read the full title of every article; consequently any arrangement at all was unnecessary labor, while the emphasizing of unessential words is confusing and worse than useless. The only purpose it could serve, so far as we can see, would be to aid in locating an article whose exact title was remembered from a previous reading.

Why should not libraries adopt for bibliographies the system used for card catalogues—select a significant key word from the title (or add one, if necessary) and place this first in black letters? Then it would be possible to find readily the articles treating of a particular topic, and not merely those whose titles chanced to begin with a certain non-significant word.

MIAMI RIVER IMPROVEMENT CONTRACTS

Details of the Itemized Bids Called For on Twelve Large Contracts—Alternative and Provisional Bids Arranged For.

After more than four years of hard work the first contracts for work to preserve the cities in the Miami valley from the effects of floods, such as that of 1913, are to be let, bids to be received at the office of the Board of Directors of the Miami Conservancy District, at Dayton, O., until 2 p. m. of November 15, 1917.

The largest sections of the work are included in the twelve contracts covered by these bids. One set of contracts is for dams, to be built to delay the flow of flood waters from the upper Miami River and its principal tributaries, so that the water reaching any point on the river below will never be greater in amount than the proposed improved channel can carry.

The general plans for these dams provide for heavy embankments, in which are set concrete outlets, through which the ordinary flow of the streams runs without hindrance until the height of any flood reaches a point where it might be dangerous to territory below when added to like floods from other streams in the watershed. The areas of the outlets are such that they will pass a definitely fixed amount, and when this amount is reached the water begins to back up behind the dam, which is high enough to retain any probable excess over the fixed discharge until the crest of the flood is passed, when the discharge, continuing at the same rate, will gain on the inflow into the reservoir. There are five of these dams, all but one of them being above the city of Dayton.

The Germantown dam is on Twin Creek, above Germantown. It is for the relief of the Miami River below Dayton and Miamisburg, and it will reduce the height of maximum floods at Middletown and Hamilton, both of which cities suffered severely from the flood of 1913. The Englewood dam is on Stillwater River, below Englewood, on the C. H. & D. R. R.. Its effect on back water will be felt at maximum flood on this river as far as Covington, some 18 miles north. The Lockington dam is at Lockington, on the Miami River. It will reduce maximum flood height at all cities from Piqua south. The Taylorsville dam is at Taylorsville, six or seven miles about Dayton. This is the only one into which the flow from another dam discharges, Lockington being above it. Its back water affects the largest area of land, although two other of the reservoirs are longer. The Hoffman dam is on Mad River, just above Dayton. Three of the dams, therefore, affect flood heights at Dayton directly and immediately, and a fourth, Lockington, at a greater distance.

Itemized bids are to be received for each contract, the items being very closely classified and the classification being the same for all contracts. Item No. 1, for stream control at dam, is to include all compensation for risk, damage, construction and removal of coffer dams outside the limits of the dams, and other work not included in the classifications following. A lump sum is bid for this item. Earth excavation above and below low water in diversion channels is included for two dams at prices for such classes of excavation.

Cut-off trenches at dams include items of earth, rock and mixed excavation above and below low water, and wood or steel sheet piling.

The items in the main dam include clearing and grubbing under the dam and in borrow pits; soil stripping, excavation for minor drainage systems, embankment by hydraulic fill, semi-hydraulic fill and rolled fill, surface dressing and grassing, furnishing and laying vitrified pipe and specials, gutter paving, concrete in gutter system and cement.

Spillway items include clearing and grubbing, earth, rock and mixed excavations; and for minor drainage systems, embankment, concrete in slope facing, paving and floor, weir and side walls, cement; gutter paving, backfilling around structures, surface dressing and grassing, furnishing and laying vitrified pipe and specials, dry rubble paving, crushed stone or gravel.

Outlet works require clearing and grubbing, earth, rock and mixed excavation above and below mean low water; and for minor drainage systems, concrete in side and head walls of entrance and outlet above and below mean low water; in conduits, above and below mean low water, in conduit linings, in paving and floors, above and below mean low water, cement; backfilling around structures, embankments, furnishing and laying vitrified pipe and specials, lumber, concrete and iron and steel in protective boom, drilling foundations or masonry, cast and wrought iron and steel, including pipe, dry rubble, paving, riprap, crushed rock or gravel, reinforcing steel in partition walls and in bases of retaining walls, and grouting of foundations or masonry.

Cleaning up is bid at a lump sum and removal of buildings also.

The items for road construction, of which there is a little in each of the contracts for dam construction, include clearing and grubbing, excavation from cut, in earth, rock and mixed, excavation from borrow, vitrified, corrugated iron and iron pipe culverts and concrete box culverts, with accompanying excavation, backfilling, concrete, cement, reinforcing steel and pipe, an item for each; road surfacing, with rolled or unrolled gravel; guard rails, wire fences, lumber, iron and steel, concrete

slab bridges, with items for earth and mixed excavation; backfilling, concrete in sub and in super-structure, cement, reinforcing steel, and iron pipe railing; also substructure for steel bridge, with like items.

The minuteness of the classification is indicated by such items as 10 pieces of vitrified pipe specials, 25 cu. yds. of concrete in gutter system, 20 cu. yds. of earth excavation for minor drainage system, 60 cu. yds. of earth and 10 cu. yds. of mixed excavation for a concrete slab bridge. The magnitude of the work is suggested by the single item on the Englewood dam of 2,970,000 cu. yds. of hydraulic and semi-hydraulic fill, and 1,160,000 cu. yds. on the Huffman dam.

The totals of the principal quantities for the five contracts for the dams are as follows:

Dam	Germantown	Englewood	Lockington	Taylorsville	Huffman
Excavation, cubic yards	200,000	375,000	200,000	750,000	300,000
Embankment, cubic yards	850,000	3,500,000	1,000,000	1,100,000	1,400,000
Concrete, cubic yards	20,000	38,000	37,000	57,000	45,000
Paving and riprap, cubic yards	1,000	2,000	1,000	5,000	1,500
Iron and steel, tons	120	180	50	400	400

Another series of contracts, on which bids are to be received November 15, cover the local bank protection at Dayton and on the Miami River, at Hamilton. These are not as extensive as the contracts for dam construction, but are still very respectable in quantities of materials involved, as shown by the following table of principal quantities:

Location	Levee embankment, cu. yds.	Channel excavation cu. yds.	Concrete retaining walls and revetments cu. yds.
Miami River, Dayton:			
Above Island Park	65,000	.....	.....
Isl. Pk. to Wash. St.	80,000	850,000	25,000
Wash. to Stew. St.	205,000	465,000	3,500
Stew. to Bway.	655,000	1,000,000	2,000
Mad. River, Dayton	35,000	20,000	1,500
Wolf Creek, Dayton	25,000	80,000	1,400
Miami River, Hamilton	.....	1,900,000	27,000*

*Also 550,000 lbs. on reinforcing steel.

The items in these contracts are as carefully classified and estimated as in the dam contracts.

The river channel improvement includes: trimming and shaping slopes, soil stripping, excavation for new channels above and below mean low water, and in river channels, in earth, rock and mixed, overhaul, surface dressing and grassing, steel sheet piling.

Levee construction includes soil stripping, embankment, material from river excavation and from borrow pits, surface dressing and grassing; cleaning, grubbing and removal of buildings.

Revetment includes concrete above and below mean low water and in flexible slab revetment, cement, reinforcing steel, timber piles, sheet steel piling, cement and miscellaneous iron and steel.

Retaining walls require excavation above and below mean low water, of earth, rock and mixture, backfilling, concrete above and below mean low water, cement, reinforcing steel, furnishing and laying vitrified pipe, crushed rock or gravel, timber piles, stone masonry, miscellaneous iron and steel.

Flood gate structures require a small amount of excavation, concrete, cement, reinforcing steel, sheet steel piling, the flood gates and miscellaneous iron and steel.

The drainage systems require excavation and backfilling, concrete in aprons, gate chambers, culverts, sewers, manholes and catch basins, cement, furnishing and laying vitrified pipe, reinforcing steel, vitrified brick lining, bituminous and asphalt paving, timber and lumber, timber piles, furnishing and laying cast-iron pipe, flood gates and miscellaneous iron and steel.

Bridge work includes raising existing bridges in Dayton for a lump sum, and excavation, concrete, cement, and steel sheet piling for bridge protection in Hamilton.

Street modifications require earth excavation for cuts and fills, gravel, water-bound macadam and brick pavements and guard rails.

Clearing and grubbing and cleaning up are separate items.

In all, bids on 12 contracts are to be received at this time. These include much the larger part of the work, although there are many contracts of less importance. Those so far assigned and which will be offered for bids later include 8 for road construction, 9 for reconstructed and new bridges, and local protection work for Tippecanoe City, 7 contracts; Fairfield, 1 contract; Piqua, 2 contracts; Troy, 4 contracts; W. Carrolton, 1 contract; Miamisburg, 3 contracts; Franklin, 2 contracts; Middletown, 2 contracts, and Hamilton, 2 more contracts.

The booklet of information for bidders gives full information regarding sources of supply for natural gas, coal, electric power, telephone service, railroad and interurban freight service, sand and gravel for concrete, stone or stone masonry, rubble paving and riprap. An organization for prompt and definite flood warnings has been in operation for years and will be continued and can be utilized by contractors.

Alternative methods of making embankment for dams are offered—combination of hydraulic fill and sprinkling and rolling, combination of semi-hydraulic fill and sprinkling and rolling, and sprinkling and rolling alone. Contractors are required to bid on but one method, but may put in bids on each one. A contractor bids on each contract separately, but can state in his bids that he wishes but one contract, that the bid is made with the proviso that other contracts named will be awarded to him also, or that the proposal has no conditions as to award of any other contract. A contractor wishing to bid under more than one of the conditions stated can submit two or three proposals, each with a different proviso as to other contracts and the corresponding differences in bids on items.

Statements of experience and reference must accompany each bid, and each bidder is required to list the machinery and equipment he expects to use in the work and whether he has it available for immediate use or must acquire it by purchase, lease or rental.

As by far the larger part of the work consists of earth moving, it is expected that the various contractors will use most of the approved machinery for wet and dry excavation and embankment.

The war and other conditions have shifted some of the responsibilities for details of administration from the Conservancy Board to its engineers, who have shown their competency for this work by the efficient manner in which they have performed their duties in the engineering department. Arthur E. Morgan is chief engineer, Chas. H. Paul is assistant chief engineer, and Ezra M. Kuhns is secretary of the Miami Conservancy District.

The WEEK'S NEWS

Convict Street Labor in Portsmouth, Va.—New York City Aldermen on Water Waste—Dallas Lighting Franchise—Schenectady Firemen Threaten Strike and Win Raise—Newark Three to One for Commission Government—U. S. Senators for Municipal Ownership of Capital Street Railways—Toledo's "Community Ownership" Franchise Completed—San Francisco and Its Street Car Problems—Dallas Traction Franchise—Municipal Markets Urged by New York Mayors—Ohio Cities Tackle the Coal Problem—Municipal Coal Yards in Three Cities.

ROADS AND PAVEMENTS

To Use Convicts on Street Work.

Portsmouth, Va.—The plans of city manager Bates for working a chain-gang on the streets and other municipal work have been approved by council. City manager Bates reported that he had conferred with the labor organizations and had secured their approval of the project. He outlined the agreement between the city and the sheriff, whereby the board of prisoners, together with an additional 75 per cent of same, was to be paid the sheriff while they were engaged on city work. He stated that the allowance for board of prisoners was as high as 35 cents per day per prisoner, according to the number and that the 75 per cent additional provided for three working meals per day. The city, he said, was to provide for guards, conveyance of the prisoners to and from the jail, and conveyance of the noon-day meal from the jail to the men.

Johnstown Has Another Bridge Collapse.

Johnstown, Pa.—City officials are going to enforce strictly the regulations governing loads on bridges by threatening fines. This action follows the recent collapse of the wooden approach of a footbridge, the fourth bridge collapse here within a year. Fifty persons narrowly escaped death while witnessing the departure of army draftees when the approach to a bridge over the Conemaugh River swerved to one side, hurling the onlookers over a 10-foot concrete wall to the river bank. Witnesses of the accident said that between 150 and 200 persons were crowded on the approach to the bridge when the parade started. The drafted men were marched across a temporary wooden bridge, running parallel to the collapsed structure. When the line of men began moving across the temporary bridge the spectators on the approach ran to one side to witness the departure. As the weight increased on one side the bridge sagged, forming a chute, which sagged about six feet from the bridge level. When the thin railing gave way many were hurled over the side. A number escaped injury by jumping, while those who were in such a position that they could not leap fell over the side and over a high concrete wall. A number were thrown into the river. The beams of the structure were found to be rotten.

Property Owner Wins Paving Litigation.

San Jose, Cal.—After having passed through the superior court in San Jose, the appellate court and the supreme court at San Francisco, judgment has been rendered in favor of the defendant, S. F. Bennett, and against the plaintiffs, Ransome-Crummey company, in the long paving litigation. Proceedings to pave West Santa Clara street were started August 21, 1911, and the work, which included about 50 feet of frontage, was finished in July, 1912. Ransome-Crummey company was the contractor, and S. F. Bennett was the property owner who refused to pay for the work. It appears that Bennett laid a concrete foundation at his own expense, and that this piece of work was inspected and approved by the city authorities. In fact, engineers asserted that the foundation laid by Bennett was superior in quality to that usually laid by paving companies. The trouble came, however, when Bennett attempted to contract with some company to put an asphalt surface on his work. This he was unable to do. The city, after due consideration of the matter, then advertised for bids covering not only the surface, but also the concrete foundation, already laid by Bennett. Ransome-Crummey company, upon commencing the work, had to break up and dig out the foundation already in place, in compliance with the city bids. The defendant found that the work might be done by private contract for 16 cents a foot, he stated, and as Ransome-Crummey charged 45 cents a foot, according to his contention, he withheld payment. Before superior judge J. R. Welch the defendant stated that the work was not sufficiently described and the boundaries not clearly enough defined in the contracts. Secondly he claimed that the street had been accepted by the city in 1889, when it was macadamized. Thirdly Bennett stated that the city charter requires that bonds for street work must be either by individual sureties owning real estate or by a California corporation, asserting that the bond involved was given by a "foreign corporation," namely, the "Guarantee and Surety Company" of New York. Judge Welch in the trial court decided the case in favor of Bennett. The case was appealed to the appellate court at San Francisco, where it was reviewed by judge John E. Richards. He affirmed judge Welch's judgment in all points. The supreme court then granted Ransome-Crummey a hearing, and the case was argued in January, and again decided September 13, 1917, in favor of the defendant. The supreme bench held that in view of the repeal of section 20 of the Vrooman act, which provided for the acceptance of streets by the city and authorized the city to collect the cost of new improvements from property owners, the case was in favor of the plaintiff, but that on the other hand, the decided failure to give the bonds required by the San Jose charter rendered the entire proceedings void, making it impossible for the company to collect for the work.

SEWERAGE AND SANITATION

To Vote on $500,000 Bonds for Sewers.

Johnstown, Pa.—At the November election the city will vote on the proposed $775,000 bond issue which will include $75,000 for the construction of a garbage disposal plant, $200,000 for the improvement of a number of streets and $530,000 for the construction of sanitary sewers and a disposal plant. The city administration is backing the proposed issue vigorously and is carrying on a campaign of education in the newspapers to point out the advantages to be expected from the proposed improvements. Mayor Franke, in a recent statement, said: "The bond issue of $500,000 for sanitary sewers is for 15 and 30 years. That for street improvement is for 10 and 15 years. The issue for a garbage disposal plant is for a period of five years. In constructing a sanitary sewer system, Johnstown is making a practically permanent improvement. The life of the sewers will be far more than the 30-year term set for paying off the bond issue. After the first 15 years, the sewage disposal plant will require the expenditure of a certain sum each year for the upkeep and maintenance. For this reason, half the issue is to mature in 15 years, and for the remaining 15 years of the issue the taxpayers will pay only on one-half the issue, so that the cost of upkeep will not be felt. Street paving, on the other hand, is not absolutely a permanent improvement. Streets will last from 10 to 30 years, depending upon the original construction and traffic conditions. The grading and drainage are permanent, and the foundation, or base, of an improved street is practically permanent. After 15 years, generally speak-

ing, it is probable that a certain percentage of the streets to be improved will again require improvement. Therefore the term of the bonds is set for this length of time. The cost is spread out over the term of usefulness, insofar as it is possible. In connection with the garbage disposal plant, the same rule applies. The plant is practically a permanent improvement. But after five years of continuous use of expenditure of a certain sum will be required each year to keep the plant operating at 100 per cent efficiency. When that time arrives, the original cost will have been paid entirely. Johnstown has been ordered by the state department of health to install a modern system of sewage disposal. Work on this system has already been started. The contract has already been let for the construction of a portion of the main sewer, and the sewers have been laid on all streets that have been paved since the plans for the sanitary sewer system were complete.

"The $500,000 bond issue that we ask the people to approve is for the continuation of the work that has already been started. Very little of the system has been built. Most of the main sewer, and most of the smaller sewers draining into it, are still to be constructed. The disposal plant is still to be built. It is necessary that the city have a sanitary sewer fund available at all times. When a street is to be paved the sewers are laid first, in all cases. This eliminates the necessity of tearing up the thoroughfare later on, for the laying of sewers. With money on hand for this express purpose, we can, when the petition of property owners on any thoroughfare is presented, asking for its paving under the foot-front plan, first install sewers, then do the paving. A sanitary sewer fund is necessary. It must be created either through a bond issue, distributing the cost over a period of years, or through direct assessment, which means that the burden of constructing the sewers is borne at one time. The former we believe to be the wiser plan."

Sewage Pumping Station Collapses.

Burlington, N. J.—The town has been left without a sewage pumping plant. Undermined by shifting sand, the new city pumping station in Sluice road collapsed recently in the middle of the night, putting the entire drainage system out of commission. Samuel Briggs, superintendent of the plant, was awakened as the structure began to topple, but got out safely. Unable to get help by telephone, he turned in a fire alarm that brought the city department to the lonely spot. The new building was erected this year of concrete and brick. It stood on the edge of a high flood protection embankment. The weight of the building, with its heavy electrical motors and pumps, is thought to have caused the collapse. As the building fell it carried away a big section of the embankment, and incoming tides have washed a fifty-foot break in the bank. The loss to the city probably will reach $75,000.

WATER SUPPLY

New York Aldermen Will Not Prevent Waste.

New York, N. Y.—Commissioner William Williams of the department of water supply, gas and electricity recently sent a communication to the board of aldermen asking it to pass an ordinance designed to prevent water waste. He asked the board to amend the code of ordinances through the insertion of the following section: "Willful waste of water prohibited. No person shall open, hold, open or fasten open, or damage or tamper with any piping or water fixtures connected with the municipal water supply or with the public water supply, within The City of New York, of any private water company, or cause any such piping or water fixtures to be opened, or held or fastened open, or damaged or tampered with, for the purpose of wasting water or interfering with the supply of water to other persons, or of defrauding or injuring the city or any private water company or any person responsible for the payment of water rates or water rents pertaining to the water so wasted. Any person who shall violate any of the provisions of this section shall, upon conviction thereof, be punished by a fine of not more than $25, or by imprisonment for not exceeding 30 days, or by both such fine and imprisonment." In his letter the commission said: "This ordinance is the outgrowth of a condition, the existence of which has been frequently asserted by owners of multiple family dwellings, particularly in connection with the discussion of the extension of the meter system. Where meters are not installed the effect of the willful waste of water for the purpose of depriving fellow tenants of a supply, or for any other purpose, is to injure and defraud the city. Where meters are installed the effect of such action is to injure and defraud the city. Where meters are installed the effect of such action is to injure and defraud the property owner, who is responsible for the payment of the water bills. In either case it is appropriate that the acts referred to should be made a punishable offense. The effect of the proposed ordinance as drafted would not be to curtail in any respect the use of water for legitimate purposes, but would merely reach those cases, if any, where persons cause water to be wasted with a wrongful intent." The committee on general welfare of the board reported that the commissioner's request be rejected because the ordinance "is entirely too drastic and it would be entirely impossible to enforce." The committee's report was accepted.

City Sued for Water Diversion.

Livingston, Mont.—The Monidah Trust, successors to the Livingston Water company, has brought suit against the city of Livingston seeking to recover $250,000 for alleged damages to the company's water supply in the Yellowstone river. It is charged that the water supply was crippled when the city built a wing dam in the river above the plant to divert the water into another channel in order to protect the city in time of high water. The city is already defendant in a suit brought to recover $150,000 claimed to be due the water company for hydrant rental.

Commission Cannot Make Rates for Municipal Plant.

Dallas, Ore.—Holding that the public service commission has no jurisdiction over the water plant of Dallas, the supreme court at Salem, in an opinion written by justice Bean, reversed circuit judge Kelley, of this district, in the case of H. V. Gates vs. the Public Service Commission. Mr. Gates constructed the plant for the city, and holds a lease upon it. Complaining against the rates exacted, the city of Dallas asked the commission to reduce them, and it issued an order reducing the rates. Gates appealed from the order, and the court held that, in contemplation of the public utility law, the water plant is owned by the city and subject to regulation by the city only, not by the public service commission.

Boroughs Lose Water Suit.

Pittsburgh, Pa.—The Supreme Court at Philadelphia has reversed the Public Service Commission in the Pittsburgh suburban suits against the Ohio Valley Water Company, appellant. The decision is against the residents and property-holders of Ben Avan Borough, McKees Rocks Borough, Bellevue Borough, Avalon Borough, Stowe township, West View Borough and an individual suit of W. B. Dawson. In closing his opinion Judge Kephart said: "In fixing a schedule of rates that would produce a return on plant value mentioned in going cost, three ways have been suggested by the authorities: First—to make the rates so high that these items in dispute would be returned to the investors from the first year of the business. This, it is readily seen would cause a prohibitive rate to be fixed. Second—to distribute the cost over a given number of years and gradually amorize it. While fairer to the public than the first proposition, it is not as satisfactory as the third one, which seems to be adopted by most of the authorities. Third—to treat these costs or values, as well as the other items of plant value, as a capital charge for the purpose of fixing a fair rate to the public. These questions must be determined from the principles of sound business, with an equal appreciation of public interest. It may be that future business from the schedule of rates now fixed may demand further regulation, the increase of business having such tendency. This is one of the consequences that follow adjustment of rates. So, too, if it is made apparent to the

commission that items of value have been omitted from the testimony, the commission, under its broad powers, may cause such action to be taken that will permit a return thereon." The commission is directed to re-form its valuation in accordance with the opinion, and upon such valuation it shall fix a schedule of rates which shall cover the expenses, depreciation and the return percentage as found by the commission to be fair. The commission committed no error in the value fixed for the Bellevue and Stowe township reservoirs, but the Neville Island property presented a much more difficult proposition. There the theory of Federal permission to sink wells, advanced to reduce the appellant's property, judge Kephart said, could not be sustained.

STREET LIGHTING AND POWER

New Lighting Franchise in Dallas.

Dallas, Tex.—J. F. Strickland has formally accepted the lighting franchise finally agreed to by the city commission following a favorable vote at the recent referendum. Strickland at once announced a three-cent reduction from the former ten-cent rate, effective Oct. 1. Under the terms of the franchise the reduction did not have to become effective until Nov. 1. At the same time the new Hobson street car franchise goes into operation. In the light plant franchise, the new company agrees to expend the sum of $2,000,000 in altering, reconstructing and rearranging and improving the distributing system, power plants and properties and in making additions and extensions, and the city shall receive $250,000 damages for failure to comply with the agreement. The reduction in the light rate also is on a graduated scale, and there will be an immediate reduction of three cents per kilowatt hour. The schedule of rates is as follows:

Light Rates—	Per K.W.H. Cents.
K.W.H. Per Month—	
For the first 800	8
For the next 1,200	6
For the next 3,000	3.6

For consumers using 5,001 and over K.W.H. per month the entire charge shall be computed from the power rate.

Power Rates—	Per K.W.H. Cents.
K.W.H. Per Month—	
For the first 300	5
For the next 4,700	3.5
For the next 3,000	3.2
For the next 7,000	3
For the next 10,000	2.6
For the next 15,000	2.2
For the next 20,000	2
For the next 30,000	1.5
For the next 90,001 and over	1.2

In compliance with this and the car franchise the city commission appointed Morris N. Baker supervisor of public utilities so that the city will keep in close contact with all the details of operation of the new companies. The supervisor is appointed by the mayor and city commission each year, and he may be removed at any time, with or without cause. The ordinance also provides for a staff of assistants. The supervisor and his assistants will have offices in the Terminal building, probably on the same floor with the offices of the lighting and traction companies. The supervisor will receive a salary of $6,000 per year. The ordinance requires monthly reports in writing as to earnings, operating expenses and finances of each public utility corporation holding franchises. The supervisor also is required to give an itemized account of the expenditures of his office. He is required to give $10,000 bond, and is empowered to appoint necessary assistants. Supervisor Baker has been vice-president of the city park board for a number of years.

Ask "Readiness-to-Serve" Charge.

Seattle, Wash.—The Seattle Lighting company, which supplies the city with gas, has filed with the state public service commission at Olympia a new tariff, to take effect on October 31, that has what is a comparatively new charge for this state, "a ready-to-serve" charge of 25 cents. This mean that when the connection is made the patron must pay 25 cents a month in addition to the regular charge. The new tariff schedule also reduces the rebate of 25 cents per 1,000 for gas, when bills are paid prior to the 10th of the month, to 10 cents. These two changes are expected to increase the revenue of the company about $200,000 a year. H. R. Clise, general counsel for the company, gave out the following statement regarding the company's move to increase its revenue: "At the conclusion of an investigation covering a period of nearly a year, the public service commission of this state, on August 1, 1913, valued the property of the Seattle Lighting Company and found that its earnings were less than 3 per cent upon that valuation. The difference between what material and supplies cost August 1, 1913, and August 1, 1917, is well illustrated by the difference in the cost of mains and service pipe. Four-inch cast iron mains cost, August 1, 1913, $34 a ton, and on August 1, 1917, $72 a ton; three-quarter-inch galvanized iron service pipe then cost 7½ cents a foot, now costs 10½ cents a foot. The high cost of living has affected our employes just the same as every one else, and we feel that the employes of public service utilities should have a reasonable increase in their wages to meet this increased cost of living and also the same favorable working hour conditions as other employes of the public and of other corporations. To further illustrate the necessity for this increase we will disregard the very heavy increase in prices between August 1, 1914, and August 1, 1916, and only make a few comparisons of the increases occuring between August 1, 1916, and August 1, 1917, in four particulars. The increased cost in oil per month is approximately $5,000; in coal per month, approximately, $4,000; in labor per month, approximately, $9,500; in taxes per month approximately, $1,500. To these should be added per month several thousand dollars occasioned by the increased cost of the very many other supplies, without mentioning the increased cost of mains and service pipe a large company is compelled to use. The change in the schedule of gas prices filed with the commission will not yield nearly the amount of the four items above mentioned. Only two changes are made. The first is the elimination of the minimum charge, and substituting a ready-to-serve charge therefor. This charge has been recognized by the different public service commissions throughout the United States as fair and reasonable. The particular method in which this company is applying it is already used in Pennsylvania, Ohio, Louisiana and other states."

Contract Ends Long Controversy.

Elmira, N. Y.—Following a number of conferences between engineers and officers representing the Potter Gas Company and the Elmira water, light and railroad company and Frederick W. Ballard, of Cleveland, the city's expert, an agreement has been reached which ends the long and bitter triangular controversy over rates and supply of gas. According to the agreement the Elmira company will receive the gas at the city line and pay the Potter company for the gas furnished by it which shall pass through the meters of the Potter company at the city line at the rate of 26.6 cents per thousand cubic feet until 500,000,000 cubic feet of gas shall have been furnished to the local concern in any one year, such year to be computed from the date the rates provided for go into effect. For all gas in excess of this amount, received in any year, the Elmira company is to pay the other at the rate of 32.16 cents per thousand cubic feet and these prices are to continue regardless of any orders of the public service commission affecting rates to consumers in the city. The Potter company agrees to use its utmost efforts to furnish sufficient gas at a sufficient pressure to take care of the needs of the local company to render satisfactory service to its domestic customers and, so far as it legally can, at all times to discontinue service and to take on no additional service, to commercial users of gas when and where such service interferes with its ability to enable the distributing company to render satisfactory service to its domestic customers. It is mutually agreed that this agreement shall go into effect when the local company shall have the legal right to charge its customers at the net rate of 52.5 cents per thousand cubic feet. At such times as the Elmira company complete and have in operation a gas holder of 500,000

cubic feet capacity, in addition to the holders already installed, it shall have the right to charge its customers at the net rate of 57.5 cents per thousand cubic feet unless such rates shall be changed by the public service commission. In any rate contest before the public service commission it is agreed that the prices herein provided to be paid to the Potter company be the basis of the cost of the gas to the Elmira company. The latter is to have access to and the right to test the meters of the other at any time that it shall see fit in the presence of a representative of the Potter company.

FIRE AND POLICE

Firemen Win Increase by Threatened Strike.

Schenectady, N. Y.—Mayor George R. Lunn was called back from Washington to act on the threatened strike of the fire department for more pay promised them. After a number of conferences the firemen agreed to stay at work and the city officials granted an increase, the General Electric Company, whose big plant is located in the city, agreeing to furnish the necessary funds for the two remaining months of the year. The firemen put their case before the city in paid newspaper advertisements. They showed that the $150 a year increase for all ranks promised them in June, 1916, had dwindled to $50 a year in the budget. They showed how the increased cost of living affected them and compared their salaries with those of firemen in other cities. Under the heading, "Things to Remember," in the advertisement, they said: "1. The fire department is composed of mechanics of all crafts who could demand much larger wages were they to leave the employ of the city. 2. Firemen should be paid salaries to conform with conditions and wages with local industries. 3. Do you know that the maintenance cost of the Schenectady Fire Department (exclusive of salaries) is but one-half that of Troy, one-third that of Utica and only one-eighth that of Albany? 4. The General Electric Co. has paid bonuses as well as increased the pay of their employes, while firemen have received less than 5 per cent since March, 1913. 5. Some of our firemen receive but $16 per week and have to support families. We are asking for an increase of $2.40 per week. 6. We offered to forfeit our vacations this year and be given the vacation money instead. This was not granted. 7. The charge that politics actuated the firemen in their endeavor to secure livable wages is not consistent with their past records. We are asked to compromise by waiting until after election, or until January 1st. We fear that to do so would establish grounds for the charge. We take this means to thank the many members of the legal profession, and business men, who have come forth with offers to help the firemen in their struggle for a living wage."

To Vote on More Pay for Firemen and Police.

Meridian, Miss.—A petition has been presented to the city council, asking for an increase in salary of members of the fire department to a basis commensurate with present increased cost of living. A similar petition is on file in behalf of the police. While expressing themselves as heartily in favor of granting these petitions, the members of the council find themselves without sufficient funds. They will therefore put the question up to the qualified voters, at the same time that the ice plant bond issue ordinance is submitted. At the present the men are paid on the following scale: $60 per month for the first year; $65 per month beginning the second year; $75 per month beginning the third year, and thereafter the same. Each of the six captains get $85 per month. Thirty men will be affected by the proposed increase. The firemen are asking pay on the following scale: $80 first six months; $85 second six months; $90 starting the second year, and thereafter the same. They also ask $100 for the six captains, $110 for the superintendent of fire alarms, $110 for the auto machinist, and $120 for the assistant chief. No increase is asked for the chief, whose compensation is $150 per month. While asking nothing for himself, chief Powell believes his men are justified in their position. He points out that the pay of the firemen has remained stationary for seven years, while everything has advanced. The men pay for their own uniform suits and caps, their rubber coats, pants, caps, boots and hats, and their wool shirts, besides the necessary extra heavy clothing for night work and bad weather. Chief Powell says that if a man has to buy a complete new outfit, as some must probably do, he cannot get one for less than $50. The men say that Meridian must pay more in order to hold together an efficient trained force of men. The city of Birmingham has made it a custom to recruit its fire deparment from Meridian. Nine former members of the local department have gone there from time to time. One of them is now a captain, and one has in turn gone from there to become chief of the St. Petersburg, Fla., fire department. The plan is to submit to the voters an ordinance calling for one-mill special levy. The ballots will provide that one-half of this is to be applied for paying increased salaries in the police department, and one-half mill in the fire department, so that the voter may express his exact preference on each proposition. The extra levy necessary must be approved by two-thirds of the voters in the election.

Big Stockyards Fire.

Kansas City, Mo.—Reports that the fire which destroyed more than half of the Kansas City stockyards and resulted in the destruction of many thousands of cattle and 3,000 hogs, was of incendiary origin persist although discredited by officials of the corporation owning the yards. The loss is approximately $750,000. J. F. Marvin, fire warden, and John Egner, chief of the fire department, both believe the fire was set, but declare that the area is so devastated that no indications of an incendiary origin could have escaped the flames. F. J. Bishop, lieutenant of the first fire company to arrive at the yards after the alarm, said three fires were burning fully 2,000 yards apart. George B. Collett, general manager of the stockyards, declared he believed the fire resulted from natural causes, and that the wind had blown sparks from the first fire, starting the other two blazes. Private detectives are investigating the rumors of incendiarism. The Kansas City stockyards were considered the second largest in the country. The fire raged for two hours. There were 47,000 cattle in the yards and it was possible to liberate most of them. Some of the cattle liberated reached the downtown sections of both Kansas City, Mo., and Kansas City, Kan.

Wind Saves Town from Destruction.

Homer City, Pa.—The change in the course of a severe windstorm is probably all that saved the central part of this town from complete destruction in a fire which did more than $30,000 worth of damage. The blaze originated in the basement of a large store in one of the most thickly built sections of town. The fire had gained much headway before it was discovered after ten at night. The wind was high and the sparks were blown for a great distance. The store burned rapidly. It was a large frame structure, well stocked and within a few minutes after the fire alarm had been given the entire structure was enveloped in flames. The town officials telephoned to Indiana and to Blairsville for aid. Fire apparatus from both of these towns were sent immediately. In the meantime a bucket brigade 500 feet long carried water from surrounding wells and poured it on the rapidly-spreading flames. The efforts were futile, however, and the fire was raging when the course of the wind drove the flames into an open space in a direction opposite to the nearest buildings. The fire had almost burned itself out when assistance came from Indiana and Blairsville.

Colored District Swept By Fire.

Berkley, Va.—Nearly one-half of the colored section, just across the city limits of Norfolk, known in years past as "Bloodthirsty," totaling 55 buildings, was ravaged by fire, entailing a loss of $35,000. The blaze started in early morning in a vacant colored tenement. Forty-seven families were made homeless. Sparks were carried by the high winds two and three blocks, and fires sprang up in every direction, which accounted for the loss being so great. The spread of the fire was so rapid, and because everybody in the community was fast asleep, the fire scattering in

many directions and catching in the shingle roofs, there was very little time for saving household effects. The fire was a spectacular one and could be seen for miles, and, notwithstanding the early hour of the morning, hundreds gathered from all parts of the town and the county. The buildings were of frame construction and most of them had shingle roofs. A church and three stores were among the large losses. During the fire the Virginia Railway and Power Company's viaduct caught several times, but only the cross-ties burned slightly. The fire was put out by the firemen and the cars were able to resume trips next morning. The South Norfolk volunteer department, with partial equipment for fighting fires, realizing inability to cope with the situation, called on Norfolk for aid, and the Berkley company and No. 1 company of Norfolk proper responded. But for the aid that the city rendered the colored section would have been wiped out entirely. The freakish way in which the fire was working had the firemen at a disadvantage. The fire burned off the largest area ever before burned in the history of Berkley. This section in years past has been noted for its fires, and a number of buildings have been burned out.

GOVERNMENT AND FINANCE

Charter Amendment Turned Down.

Rome, Ga.—The citizens disapproved an amendment to the city charter, which was passed by the state legislature, by a vote of 644 to 300. The qualifications necessary for voters were not clearly defined and many are still being challenged—1,424 being the total number registered. The proposed amendment would have meant the election of commissioners by wards instead of at large. The campaign before election was marked by vituperative advertising in the newspapers.

Special Tax Levy Defeated.

Charleston, W. Va.—By a vote of three to one the special levy proposed by Mayor MacQueen to pay for needed improvements, was defeated. L. S. Echols, of the state tax commission, had declared before election that even should the levy be approved by the voters it would be illegal, because the council had acted illegally in calling for an additional levy after the budget had been approved. The levy was to be used for substations and an alarm system for the fire department, increased salaries and to meet necessary expenses.

Newark Votes for Commission Form.

Newark, N. J.—Although held under unfavorable conditions, the special election resulted in the approval by the voters of the adoption of the Walsh act by a splendid vote of 19,069 to 6,053. The majority was 13,016, the total was 25,122 and the affirmative vote 1,784 more than necessary. After Nov. 20, the mayor, the common council, the board of works and all other boards and commissions, will be replaced by five commissioners. With the exception of those protected by the civil service, all officials major and minor, will go out of office, and the city charter of 1857 be superseded. The change in favor of commission form carried in every one of the sixteen wards and only nine election precincts, out of 202, gave opposing majorities. Four of these precincts were in the third ward, where socialist sentiment, which opposed the new form, is particularly strong. Mayor Raymond opposed the Walsh act. The board of trade and other commercial and civic organizations carried on a vigorous campaign in favor of commission form. The new commissioners will be elected Nov. 13 and already nearly a hundred candidates have filed intentions to run for the office of commissioner. The commissioners will be elected under the preferential system of voting, which eliminates the need for a primary. On the ballot which will be used, voters may indicate five first choice and five second, third or other preferences among the nominees. The commissioners will be elected to serve until the third Tuesday of May, 1921, after which they will be chosen for terms of four years. The salary of the commissioners will be $5,000 a year, except in the case of the mayor, who will receive $5,500. The office of mayor, as now constituted, with its salary of $10,000 a year, will be abolished.

TRAFFIC AND TRANSPORTATION

Investigators Urge Municipal Ownership of Capital Cars.

Washington, D. C.—Government ownership of the street railways of the District of Columbia or government control through a strong public utilities commission is the most important feature of the report on the recent street car strikes laid before the Senate before adjournment. Of the committee appointed to investigate, Senators Pittman, Johnson and Jones report, the two first named reporting together. Both reports vigorously assail the company and its president, Clarence P. King, for causing the strike. The senators say that the company should have "understood present-day social economics" and agreed to collective bargaining and recognition of the union. The report goes into great detail concerning the events of the strike and testimony on the subject and discusses possibilities for preventing recurrence of strikes. Senator Pittman recommends in his conclusion: "The creation of an individual public utilities commission with enlarged powers to regulate and control the public utilities of the District and examine into and supervise the relations between such public utility employers and employes and pass upon grievances and disputes that may arise between them. The advisability and practicability of the consolidation of the two street railway companies operating in the District should be carefully investigated and finally the question of government ownership and operation of these public utilities should be fully considered." Senator Johnson says: "Personally, I am of the opinion that government ownership and operation of the electric railways of the District of Columbia is wise and desirable, and I recommend that such action be taken. I have not had an opportunity to investigate the question of the consolidation of the two lines, and therefore am not prepared to express an opinion upon the desirability or undesirability of this proposition." Senator Jones says: "My personal views are very favorable toward government or municipal ownership and operation of street railways, but I have not given the conditions in the District of Columbia sufficient study to feel justified in joining in a specific recommendation to that effect. I do believe that efficiency of service and economy of operation would be served by the consolidation of the two lines now operating in the District, and a just and equitable basis for such consolidation can be worked out. I recommend that this be done."

"Community Ownership" Franchise Plan.

Toledo, O.—After more than thirteen months of drafting, conferences and discussions the city and the street railway company have decided upon the terms under which the company will receive its franchise. The main features of the plan as agreed to by mayor Milroy's street railway commission and Henry L. Doherty of the Toledo Railways and Light Company are as follows: Provision for local ownership of the street railway; provision for strict city control of service; provision for municipal purchase on an instalment basis under a leasing arrangement; a guaranty of the city's right to purchase by condemnation or by agreement on a valuation basis, and a scale of fare measured by the cost of the service rendered. The agreement provides for the organization of a community company, which will own the property. The intention is that local people shall buy the stock of this company and later on it is expected that the city will take over the road on the instalment plan under a leasing arrangement. The grant is to extend for twenty-five years. If at the end of ten years the city has not taken over the property or the grant has not been renewed an amortization fund may be established for the retirement of the stock at the end of the franchise term. Not to exceed one-half of one per cent of the capital value is to be paid into this fund monthly and the total amount to be raised in the fifteen years is not to exceed 75 per cent of the capital value. This is similar to a sinking fund and will be paid into the hands of trustees. Holders of stock in the community company will be paid six per cent on their investment. In the event the city takes over the property they will

receive six per cent premium over par value for their stock. After five years the city may purchase the property by the payment of 25 per cent of the purchase price, which is to be found by making a physical examination of the property. It is provided that a fund to apply on this payment may be accumulated from excess receipts and from any other sources. The rate of fare is to be based upon cost of operation, including interest and dividends. A sliding scale will be adopted to take care of varying business conditions. It is presumed that this will be patterned after the plan followed in Cleveland, although the figures may not be the same. The city council is to have full control of the service. All questions upon which any agreement cannot be reached are to be submitted to arbitration. The award of the arbitrators will be enforced by withholding one-sixth of the dividends until the company has complied with the findings of the arbitrators. The new grant must now be submitted to a referendum vote If the measure is approved the community company will be organized.. Stock in the new company will be sold on the instalment plan. The members of the commission expect that the stock will be taken readily. Ten thousand copies of the tentative draft are to be printed at Doherty's expense. They will be supplied to the Central Labor Union, Commrce Club, civic organizations, to the city clerk, and to other mediums of distribution.

Safety Commission Ends Car Strike.

Minneapolis, Minn.—After a short strike, which tied up the street car systems of Minneapolis and St. Paul, the men have returned to work according to terms ordered by the state public safety commission. The car men had demanded reinstatement of fifty-seven men who had been discharged and recognition of the union. The commission, in its orders, declared that the issue of "unionism or non-unionism should not during the war be involved," and ordered that the company reinstate the discharged men and to investigate reasons for their dismissal. The men returned to work, and after investigation forty-four of the fifty-seven were reinstated permanently, while of the thirteen others a number had either resigned of their own accord or had been discharged on sufficient grounds. Rioting marked the beginning of the strike in St. Paul.

Street Car Situation in San Francisco.

San Francisco, Cal.—The street car strike still continues officially, althought many men have returned to work, the men voting almost unanimously against stopping the fight. Meanwhile further steps are being taken towards the purchase of the system by the city. Valuation of the company's property has already begun, conferences having been held by engineers representing both parties. The state railroad commission is also making a valuation, and both these valuations will be presented to the voters when the purchase is to be decided upon at an election. Meanwhile the municipal street railway has been reaping a harvest. The total earnings for September reached the highest point in the history of the system. During the exposition, when thousands of visitors were in the city, the lines had, in August, 1915, earnings of $236,935. With the aid of the Church Street line, which has since been built, the municipal system last month earned a total of $313,125, or an increase of $76,189. Each day during the strike thousands of dollars have been diverted to the earnings of the municipal lines. It began the first day with a few hundred dollars. After the strike had been in operation for a week the earnings began to climb at the rate of between $2,000 and $3,000 a day, until they reached, on occasions, points as high as $5,000 over the same day of the preceding year. While a very large part of the earnings is offset by heavy expenses, and it cannot be expected that the extra earnings are all profits, it is stated by assistant superintendent Fred Boeken that at the present rate, if the strike lasts a few weeks longer, between $200,000 and $250,000 will be added to the surplus of the system. The Parkside extension of the Twin Peaks tunnel transportation system is to be built, mayor Rolph having signed the ordinance providing for construction of more municipal railroad tracks. This followed the unanimous passage of the ordinance by the board of supervisors. The ordinance authorizes the board of public works to prepare plans and specifications and contract for necessary materials for construction of the line, which will tap the Parkside and southerly section of the Sunset district. The forces of city engineer M. M. O'Shaughnessy are proceeding with the plans and specifications immediately. Finances for the prosecution of the enterprise have been provided for. The supervisors have set aside $90,000, the estimated cost of the contract, from the funds of the municipal railroad. Meanwhile the United States Railroads has filed with the board of supervisors claims for damages from the city amounting to $856,250, based on the city's action in paralleling the tracks of the United States Railroads on Market street from Van Ness avenue to Church street. The claim is divided into three items—depreciation of value of franchise, $700,000; loss by excavation, $25,000, and loss of revenue at $750 a month to 1929, $131,250. This is the second step to be taken by the company in protecting its claim to an exclusive right to operate cars on Market street, the first having been the suit for an injunction to prevent the construction of parallel lines by the city. This injunction was denied by federal judge Hunt, and is now on appeal to the Supreme Court of the United States.

Street Car Service Abandoned.

Bristol, Va.—Street car service has been suspended permanently by the Bristol Traction Company. Officials of the company say the property of the company will be sold for junk as soon as a buyer is found. Service on the line was abandoned after the receipt of a court confirmation of the recent sale of the company to the bondholders. The regular schedule of the Holston Valley line will be maintained as before, say the officials of the company. The tracks and wire owned by the company will be removed immediately and offered for sale. Seven or eight cars will also be sold.

New Traction Franchise in Dallas.

Dallas, Tex.—C. W. Hobson has formally accepted the franchise to operate street railways which was recently approved by the voters. The price of street car tickets were immediately reduced to 22 tickets for $1. In filing his acceptance, Mr. Hobson did so with the understanding that he is to carry out immediately one of the three demands of the franchise—the spending of $1,000,000 in altering, reconstructing, rearranging and improving the street railway properties and making additions and extensions. The other two provisions—the building of two interurban lines, the first within six months after operations under the new franchise are begun, and the second within six months from the time the gross earnings from the railway properties east of the Trinity river or the gross earnings per mile of those properties reach certain sums stipulated in the franchise—he deemed impossible to accept because of the war "or other cause which could not reasonably have been anticipated" when the franchises were framed. He declined to accept unless the city agreed that the delay was covered by the clause in the franchise reading "unless prevented by war, strikes, riots, acts of God, casualty or other causes which could not reasonably have been anticipated." According to the new street car rate schedule, the maximum rate of fare for a single continuous ride within the present limits of the city of Dallas, in one direction, over any route of said company, shall be 5c cash fare, universal free transfer, and including the maximum rate the following schedule or scale of fares is hereby established:

(a) Five-cent cash fare; universal free transfer.
(b) Five-cent cash fare, six tickets for 25c; universal free transfer.
(c) Four cents cash fare, 1c transfer, no rebate.
(d) Four cents cash fare, 1c transfer, 1c rebate.
(e) Three cents cash fare, 1c transfer, no rebate.
(f) Three cents cash fare, 1c transfer, 1c rebate.
(g) Three cents cash fare, two tickets for 5c, one transfer, no rebate.
(h) Three cents cash fare, two tickets for 5c, 1c transfer, 1c rebate.
(i) Two cents cash fare, 1c transfer, no rebate.
(j) Two cents cash fare, 1c transfer, 1c rebate.

Each of the foregoing rates of fare when in force shall be the rate of fare for a continuous single ride within the pres-

ent limits of the city of Dallas in one direction, over any route of said company, whether enumerated in Sec. 1 hereof or not; and when any of the foregoing rates of fare is in force with regard to which a ticket rate is provided the company shall sell, on all of its cars, at all times, reissuable tickets at the rate provided, each of which tickets shall entitle the holder to one such ride.

At all times any passenger demanding a transfer ticket, at the time of paying such cash or ticket rate of fare as shall then be in force, shall be entitled under the provisions of the rate of fare then in force as to transfers, to transfer from the route on which he shall have paid such fare to any other route of said company, except in a substantially opposite direction on a route parallel or substantially parallel thereto, and to ride continuously to any point upon such second route within the limits of the city of Dallas, provided he transfers to a car upon such second route within five minutes after leaving the car upon which he shall have paid fare, or to the first car of such company passing such transfer point upon such second route, and at the first point of intersection of said route reached by the car upon which he shall have paid fare. If cars upon two or more routes are operated regularly along the same streets, passengers who are able to reach their destination by one of said routes without transfer to another of said routes, shall board a car upon the route reaching such destination, and shall not be entitled to transfer thereto from any other route.

The company shall not be required, however, to furnish a round trip for a single fare, nor to carry any passenger to any point upon its railway and from such point to the vicinity of his starting point for a single fare; and the company may, subject to the approval of the Board of Commissioners, hereinbefore provided, make such reasonable regulations, not inconsistent with the provisions of this ordinance, as may be necessary to prevent misuse of transfers.

The company shall furnish free transportation to the policemen and firemen of the city of Dallas to the extent now permitted by law. Children of 12 years of age or less, and students of not more than 17 years of age, shall be carried on the company's lines for one-half of the regular fare collected for transportation of adult persons as now required by law.

Minimum charge for electric light, 50c per month.

Minimum charge for power for continuous service, $1 per meter, plus 25c per horse power per month above five-horsepower installation.

Minimum charge for power for emergency or break-down service where electric current is secured from some other source, 75c per horse power per month.

All bills shall be subject to a discount of 10 per cent. if paid within ten days after presentation.

The above schedules of rates will continue in force for one year, and thereafter the rates shall be changed from time to time as follows: Whenever the amount credited to the interest fund, less the proportionate accrued payments to be made therefrom shall be less than $150,000 by the amount of $40,000, it shall be prima facie evidence of the necessity of raising the rates, and the board of commissioners shall immediately adopt a newer and higher schedule of rates. Whenever the balance in the interest fund, less the proportionate accrued payments be made therefrom shall be more than $150,000 by the amount of $40,000, it shall be prima facie evidence of the necessity of lowering the rates, and the board of commissioners shall immediately adopt a newer and lower schedule of rates.

MISCELLANEOUS

Municipal Markets Advocated by Mayors.

Albany, N. Y.—In a letter to the mayors of the state, mayor Cornelius F. Burns, of Troy, president of the State Mayors' Conference, directs attention to the importance of each city establishing a department of markets as authorized by the farms and markets law. Several cities have already taken action, says Mayor Burns, among them being New York, White Plains, Elmira and Troy. Some have the subject under consideration, but a number have as yet made no move to help in the distribution and conservation of the food supply. To these Mayor Burns, in behalf of the conference, directs an urgent appeal for immediate and favorable action. "Each Empire state city must do everything it can to help the nation supply its allies with food and to prevent suffering at home," writes mayor Burns, "A department of markets in your city can stimulate food production, organize local food handling, eliminate waste and educate your people to reduce consumption where it is excessive and to substitute as largely as possible other foods for those which are scarce or are needed for our allies and the soldiers at the front. It can conduct locally the campaigns of the federal and state commissions and help these bodies to enforce their orders in your community." Director W. P. Capes, of the state bureau of municipal information supplemented mayor Burns' plea with a statement showing progress the cities have made during the last six months in dealing with the food problem: "Before the bureau began its investigation of public markets in American cities, 15 Empire state cities had one or more public markets. Now 23 are operating markets. The three first class cities have been operating markets for several years and Rochester has recently decided to enlarge its system by establishing curb markets. All of the second class cities in the state now have markets, Utica and Binghamton having started these activities during the summer. Of the 13 third class cities which now have markets, six began operations this summer for the first time. Several other cities have committees of aldermen and chambers of commerce investigating the subject. More importance has thus far been placed by the cities on the problem of distribution than on that of conservation and the comparatively small number of cities which have to date created departments of markets. Those who have studied the situation believe conservation of food is of vital importance now and will be for some time to come. The establishment of a municipal department of markets will provide in each city the machinery to handle both ends of the food problem."

Ohio City Officials Seize Coal.

Columbus, O.—Acute coal shortage, followed by shutting down of public buildings and factories and hardship among consumers, recently resulted in seizure of carloads of coal by officials in a number of cities in Ohio. Mayor Karb, of this city, through Senator Pomerene, effected a partial suspension of the Northwest coal priority dictum, which threatened to shut off the only coal supply Columbus municipal plants have. Dr. Garfield, national fuel administrator, agreed to modify the coal order to a certain extent. The George M. Jones Coal Company, Toledo, recently notified service director Borden that it would have to send all coal to the north and cut off the Columbus supply. The Jones Company has been the only bidder on municipal coal in the last three month, and with its withdrawal administration officials feared a serious situation would confront them. The shortage threatened to leave Ohio cities without any fire protection. The state coal clearing house operated with state fire marshal Fleming in an effort to get coal.

Dayton, O.—Suddenly confronted with immediate coal famine the city commission sent city manager Waite to Washington to obtain relief from the fuel administration. The city manager was also empowered to investigate the whole situation and take action. Meanwhile Governor Cox seized about 1,000 tons of coal at Cambridge and sent it to Dayton, where the city distributed it. The public buildings received a supply and citizens were allowed one ton each at a reasonable price. The entire consignment was quickly sold, $6,806 being received for 1,384 tons.

Akron, O.—When the city water works was threatened with a tie-up four cars of coal were confiscated from the Pennsylvania yards. The railroad company placed armed guards to prevent further seizure. A force of Akron special police appeared, armed with rifles, and railroad dectectives, outnumbered, made no resistance. Three carloads of coal were taken for the city's pumping station.

Cleveland, O.—The first indication of impending shortage of coal for city plants was felt when no bids were received on the required 75,000 tons for the year's supply for the water department, 200,000 tons being the total amount needed by the city during the coming year. Commissioner of water Dusinberre said that up to November 6 last year the city was buying slack coal at 97 cents a ton at the mine, while the Government fixed the price on this grade at $1.75. When famine suddenly struck the city, and hospitals, schools and other public buildings were left without coal, the city distributed about fifty carloads in small lots, using coal sent by the governor.

Bucyrus, O. Six 50-ton cars of coal in transit were confiscated by mayor E. J. Songer. This coal was consigned to lake shippers and not to private consumers. Each of the three dealers in Bucyrus received two cars of coal, which they paid for as soon as adjustments of rebilling were made. The coal was delivered to private consumers at $5.75 a ton. All school buildings will be changed from coal to gas heating.

Shelby, O.—Mayor C. E. Morris confiscated two carloads of coal, and the fuel was sold to those Shelby families which were in immediate need at the rate of $5.50 a ton. The car was shipped from Columbus to Sandusky and had been set off at Shelby by mistake.

Washington, D. C.—Mayors of cities and governors of states who announce that they are going to seize carloads of coal on the tracks and sell the fuel to the poor at cost are playing politics at the expense of the public, according to a statement by the federal fuel administrator, Dr. Harry A. Garfield. Not only are they volating the law in confiscating shipments consigned to other parties, but the cost of the coal is certain to be more to the consumers that it would be taken legally. Dr. Garfield said these officials are assuming "to exercise powers not vested in them." Furthermore, he pointed out, any coal taken by city or state officials must be paid for at the price fixed in the contract for its sale, not at the price fixed for by the Government. If the coal was contracted for at $4.00 prior to the time the Government fixed a price running from $2.25 to $2.60 in Ohio for prepared sizes, it must be paid for on the $4.00 basis, with perhaps an additional charge for damages, due to delay in delivery. On the other hand, if the coal is seized by the federal fuel administrator in accordance with law and delivered to the community needing it, the price paid is the Government price instead of the contract price. As a result the price to the consumer, even though sold at cost in both cases, is less if handled by the federal fuel administrator. Dr. Garfield said that on receipt from the proper officials of a statement naming the public institution requiring coal or the dealers supplying coal to domestic consumers in need, the amounts being specified and also the places at which delivery is to be made, coal will be ordered shipped immediately. In every case coal will be furnished at Government prices.

The Annual Municipal Parade in Dallas.

Dallas, Tex.—The fifth annual civic parade of the various departments and employes of the city of Dallas was held to celebrate the opening of the State Fair. The first division was headed by John W. Ryan, chief of police, who was chief marshal of the parade. With him was a body of mounted police. Next in line came a striking motor float, called "The Spirit of Dallas," decorated entirely in white. The cadets of the high schools of Dallas in uniform, numbering about 200, followed and then came automobiles containing the governor, the mayor and other officials. Mrs. Eva Farley, police matron, occupied the next automobile, and was followed by the two patrol wagons of the police department. Forty-eight patrolmen and Sergeant McKeehan made up the next section of the division. The fire department composed the first section of the next division. E. R. Naylor was marshal of this division. Following him came the car of the chief of the department, H. F. Magee. The automobiles of the three assistant chiefs, the superintendent of police and fire signals, the line department and the fuel wagon were next in line. The hose wagons of Companies Nos. 1 and 2 were followed by a wagon bearing this placard: "Dallas Has the Lowest Key Rate in Texas. Why?" Then came the largest motor pump in the department, the capacity of which is 1,500 gallons a minute. Another piece of equipment bore a placard stating that the department has 170 paid men, fourteen motor-drawn vehicles and twenty-two horse-drawn vehicles. Fire company No. 3 made up the third section of this division and was composed of numerous horse-drawn pumps, hose wagons and the big Alex Sanger extension ladder. The park board, board of health, board of public welfare, board of appeals, park department, playgrounds department, city forester and boy scouts made up the remainder of the second division. The parks and playgrounds departments were represented by two attractive floats. The first consisted of an embankment of ferns, palms and trailing roses in full bloom. The second was made up of a large number of boys and girls, who frequent the playgrounds of the city. At a short distance came the city legal department, and not far behind was the city auditor's department and the city secretary, with the employes of their offices. The paymaster, tax department, welfare department, health department, engineers' department, inspection department and water department were next in line. The White Rock municipal farm was represented by two floats. The first of these showed a prisoner caged behind bars. The next was a small house, with windows and comfortably furnished. The intent of the exhibit was to show the old way and the new way of handling city prisoners. The health department section included the emergency hospital ambulance and automobiles containing the nurses connected with the city hospital. The officials and employes of the engineers' department, inspection department and water department were in the next section. The fourth division of the parade was made up of the street and bridge department, street cleaning department, garbage removal department, the zoo, negro auxiliary of the welfare department and negro employes of all departments. The street and bridge department section included a large number of scrapers and other equipment. The street cleaning department presented a line of water wagons, street sweepers and other heavy equipment. A big motor water wagon displayed a placard saying that this machine does the work of twelve horse-drawn water wagons. There were a number of bands in the parade.

Mayor to Do City Planning—Fires Commission.

San Diego, Cal.—The city planning commission has been removed in a body by mayor Louis J. Wilde and he has notified the council of his action. The membership includes H. B. Bard, a member of the council. Others on the commission were Julius Wangenheim, chairman; C. H. Bartholomew, O. W. Cotton and W. W. Whitson. Among his reasons for dismissing the entire body the mayor stated that the commission since its creation had failed and neglected the duties for which it was created. One was the planning and recommendation of buildings intended to better public service, one espcially being a much needed city hall. Another was that the commission had failed to prepare maps or any outline for future betterment of municipal conditions. The members of the new commission were not named by the mayor. The mayor has intimated that if there is any planning to do, he will do it himself.

Municipalities and the Coal Problem.

Bluefield, W. Va.—The city has established a municipal coal yard and is selling fuel to residents at $4.30 a ton. The coal is being shipped regularly from the Clinch Valley and the Pocahontas fields. The new yard is of sufficient size to handle all demands. The city is charging for the delivery according to distance, and after discussion the council decided that the yard would be run so that there would be no profits.

Omaha, Neb.—Following constantly rising prices charged by local coal dealers the city commission decided to establish municipal coal yards, and they are now in successful operation. Coal is shipped from Montgomery County, Ill., and is being sold at the asphalt plant and at another city yard. Offices are in the city hall. The yards are being run on a cash basis, and efforts are made to have consumers buy direct from the cars.

Portland, Ore.—The council has authorized the establishing of a municipal fuel yard. Fuel amounting to 50,000 cords of cord wood and 20,000 cords of slab wood and 10,000 tons of coal are to be offered first, when shortage makes it necessary at the beginning of next year. Ivan Hanson is acting as special investigator for the city, and it is proposed to invest about $65,000 to begin with.

NEWS OF THE SOCIETIES

Calendar of Meetings.

Oct. 28-30.—TEXAS CONFERENCE ON SOCIAL WELFARE. Annual convention, Houston, Texas.

Nov. 13.—NATIONAL TAX ASSOCIATION. Annual conference, Atlanta, Ga. Secretary, Fred R. Fairchild, Yale University, New Haven, Conn.

Nov. 14-16.—FIRE MARSHALS ASSOCIATION OF NORTH AMERICA. Annual convention, New Orleans, La. Secretary, W. M. Campbell, New Orleans, La.

Nov. 15-16.—ASSOCIATION OF URBAN UNIVERSITIES. Annual meeting, Pittsburgh, Pa. Secretary, Frederick B. Robinson, City College, New York, N. Y.

Nov. 19-24.—CITY MANAGERS' ASSOCIATION. Annual meeting, Detroit, Mich. Secretary, W. L. Miller, City Manager, St. Augustine, Fla.

Nov. 20-21.—ASSOCIATION OF GOVERNMENTAL RESEARCH AGENCIES. Third annnal meeting, Detroit, Mich. Secretary, C. O. Dustin, Statistical Bureau, Red Cross War Council, Washington, D. C.

Nov. 20-23.—PLAYGROUND AND RECREATION ASSOCIATION OF AMERICA. Recreation Congress. Secretary, H. S. Braucher, 1 Madison Ave., New York, N. Y.

Nov. 21-24.—NATIONAL MUNICIPAL LEAGUE. Twenty-third annual meeting, Hotel Statler, Detroit, Mich. Secretary, Clinton Rogers Woodruff, 703 North American Bldg., Philadelphia, Pa.

Jan. 3, 4.—NEW JERSEY STATE LEAGUE OF MUNICIPALITIES. Annual convention, Trenton, N. J. Secretary, Clinton A. Swartz, Trenton, N. J.

Jan. 15-17.—VIRGINIA GOOD ROADS ASSOCIATION. Seventh annual convention, Richmond, Va. Secretary, C. B. Scott, Richmond, Va.

Feb. 6-13.—FIRST CHICAGO CEMENT MACHINERY AND BUILDING SHOW. Supersedes annual Chicago Cement Show. Held at the Coliseum, under direction of the National Exhibition Co.

March 17-24.—PAN-AMERICAN CONGRESS ON CHILD WELFARE, Montevideo, Uruguay. Secretary, Edward N. Clopper, 105 East 22d Street, New York, N. Y.

California League of Municipalities.

The twentieth annual convention of the California League of Municipalities was held at Santa Rosa, September 24-28. The attendance was good, more than four hundred registering by the close of the second day. In addition to the convention of the California League of Municipalities, the Milk and Dairy Inspectors convened at Santa Rosa. Professor W. B. Herms, in charge of rural sanitation at the University of California, spoke on "Mosquitoes, Malaria and Fleas" to the delegates of the convention. He dwelt particularly on their relation to the dairying industry.

Interesting talks at the second day's session included: Mark C. Cohn, Director of the Housing Bureau, State Commission of Immigration and Housing, explained the new housing law and other relative laws. Max Thelen, president of the California Railroad Commission, went into explanatory detail on grade crossing laws within the jurisdiction of municipalities. He said that it would cost more than $300,000,000 to do the work in California, but that such a goal must ultimately be aimed at. He said the raising and lowering of difficult and hazardous grade crossings represents the hardest problem before the Railroad Commission today. Professor M. E. Jaffa, of the University of California, talked on "Conservation vs. Economy."

On Wednesday morning the three departments of city officials, street superintendents and engineers, clerks, auditors and assessors and city attorneys, met and elected department officers. These resulted as follows:

City planning—President, Thomas H. Reed, City Manager, San Jose; first vice-president, Albert Lee Stephens, Los Angeles; second vice-president, Miles O. Humphries, Fresno; secretary-treasurer, Charles H. Cheney, San Francisco; executive committee—Mark C. Cohn, San Francisco; George A. Damon, Pasadena; Oscar Ford, Riverside; L. A. Handley, Los Angeles; A. F. Heuer, Alameda; W. J. Locke, San Francisco; A. S. Lavenson, Oakland; Dr. J. C. Meriam, Berkeley; Chester H. Rowell, San Francisco; C. F. Stearn, San Francisco; M. I. Sullivan, San Francisco; G. G. Whitnall, Los Angeles; F. C. Wheeler, Los Angeles.

City Clerks, Auditors and Assessors—President, C. O. Boynton, Auditor, Long Beach; vice-president, Miss Elma Early, City Clerk and Assessor, San Mateo; secretary, D. C. Scribner, City Clerk and Assessor, Napa; executive committee—F. C. Merritt, Oakland; H. L. Moodey, San Diego; Herbert B. Snyder, Santa Rosa; Miss Donna M. Winning, Los Gatos; D. S. Stafford, Covina.

State Controller John S. Chambers made a strong plea for the "State Board of Authorization and Limitation of Expenditure Law."

Urging that the opposition of some of the school people is groundless, Chambers explained the necessity of limitation of public expenditures, and asked that the law be sustained when it comes before the people on the referendum. He said in part:

"Because this law limited the annual increase in county expenditures to a minimum of 5 per cent., although due provision was made to cover emergencies and urgent needs and there were other safety valves also, certain of our school officials, State and local, assumed that the revenues of the schools would be imperiled and promptly proceeded to invoke the referendum.

"I am more firmly convinced than ever that the laarm of the school people was and is without basis. The schools are amply protected. They will not be denied money for their proper, even generous, support and maintenance. If they desire more than this, they should be denied, and this suspended law, if finally approved by the people, will make such denial possible. If the idea is to put the schools in a class by themselves, to give them all the money their officials wisely or unwisely may ask; to have no real supervision, no check, then the sooner this programme is laid before the taxpayers for their approval or disapproval the better it will be.

"Last year—that is, for the fiscal period ending June 30, 1916—the people of the State of California expended over $37,000,000 for educational purposes, or more than $12 per capita.

"These are large sums, my friends, huge sums, and I think justify concern upon the part of all of us. If there is no waste, or little, comparatively speaking, all right; the people of California stand ready to continue the good work, and better. But if there is serious waste, then let it be ascertained as definitely as may be and stopped. No part of our government, State or local, should be exempt from supervision, investigation, correction, and, if necessary, reorganization.

"The cost of government not only has advanced, as was logical, but it has advanced too fast, out of proportion to certain other elements we must consider, as population, wealth and income. So the great increase in the tax burden has forced the taxpayer to demand relief. And his demand is not being made in a whisper. He calls for the elmination of waste, for the postponement of projects and development not really necessary now until the brakes have been put on, until the business of government is put upon as efficient a footing as that of private business, or as nearly so as can be hoped for under politics.

"But if the limitation of expenditures is a proper policy, why confine it, as does this bill, to counties alone? The abnormal growth in the cost of government is not peculiar to the counties.

"Both the State and the cities should be brought under limitation laws as well as the counties. It would require, however, the approval of the people, by the amendment of the Constitution, to do so.

"For the last year the State, the counties and the cities expended for all purposes, including bond interest and redemption, construction work and so on, as well as for the maintenance of the governments themselves, the huge sum of $175,868,482.94, of which the State's proportion was $36,035,889.77, the counties', $74,649,396.73 and the cities', $65,183,196.44.

"Education, highways and bond interest and redemption cost in round numbers, it will be noted, $81,000,000, leaving $94,000,000 that went for the maintenance of the three forms of government, for the care and support of penal, charitable and curative institutions and for construction, regulative, benevolent and other purposes. That there is room for curtailment is not to be douted."

Addresses were also made by State Treasurer Friend W. Richardson and others. State Highway Commissioner C. F. Stern addressed the delegates on the commission's work.

Probably one of the most important features of the entire convention was a conference on city paving. A symposium of experiences and suggestions and of new paving ideas was formed by the street superintendents and city engineers that spoke. D. W. Cozard, of San Jose, told how the city does its own paving.

The city planning department today adopted a resolution urging that the actual cost of grading and of grade crossings at union terminals be added to the investment of the railroads and that they be allowed a fair return on this cost.

A demonstration of street construction, scarifying, rolling and re-oiling of three blocks of street drew the attention of the city engineers and street superintendents on Saturday morning.

Edward Rainey, secretary to Mayor Rolph, of San Francisco, aroused a great deal of enthusiasm when he told of the forward strides San Francisco has taken and is taking toward complete municipal ownership, dwelling in particular upon her transportation problem. Rainey predicted that the time was not far distant when San Francisco would own her transportation facilities in their entirety.

City Attorney George Lull, of San Francisco, told of the recent decision of United States Circuit Judge William H. Hunt granting the City of San Francisco the right to parallel the United Railroads' tracks. He drew attention to the three points emphasized: the old custom of granting long franchises to the detriment of the city's interests, the extension of executive power to include the financial welfare of the city, and the fact that the law is progressive.

League of Virginia Municipalities.

The twelfth annual convention of the League of Virginia Municipalities was held at Lynchburg, Va., September 18-20. Richmond was selected for the place of meeting of the 1918 convention and officers were elected as follows: President, State Senator E. R. Fuller, of Richmond; first vice-president, Mayor E. W. Calfee, of Pulaski; second vice-president, Frank Talbott, Danville; third vice-president, Mayor Royston Jester, Jr., Lynchburg; secretary-treasurer, L. C. Bruison, Portsmouth.

The convention began at 4 o'clock Tuesday afternoon, with Mayor Jester presiding. An addres of welcome was delivered by State Senator Walter E. Addison and the response on behalf of the league was made by Mayor J. T. Hanvey, of Portsmouth.

A. R. Long, chairman of the Lynchburg Farm Board, spoke on the "Lynchburg City Farm." Lynchburg is the only city in the state operating a farm, and following the address of Mr. Long the delegates were taken to the city farm in automobiles.

Mayor A. B. Davies, of Clifton Forge, discussed "The Way to Provide and Manage Fire Fighting Equipment in the Small Cities." Colonel W. H. Sargent, Jr., president of the Board of Aldermen of Norfolk, discussed "Consolidation and Annexation." City Manager R. Stuart Royer, of Fredericksburg, told the league about "Street Improvement in Fredericksburg."

The feature of the program of the evening of the second day was an address by Judge Frank P. Christian, of the Lynchburg Corporation Court, on "How City and Town Government May Be Made More Truly Representative of the Will of the People."

Fire Chief James McFall, of Roanoke, was on the program for an address on "How Virginia Cities and Towns Should Fight Fires Before They Are Lit" for the Wednesday evening session, but owing to pressing business due to the motorizing of the apparatus of his department he was unable to be present. The address of State Senator Edward R. Fuller, of Richmond, on "Municipal Economies in War Time" was delivered in the place of Chief McFall's address.

The speaker dwelt upon the tremendous advance in the cost of material and labor, declaring that war prices had operated to give less for the money than at any other time in the last generation. "The city," the speaker stated, "cannot afford to be less patriotic than the private corporation during the war. If the private business must 'double up' and curtail its list of employes in order to release men for war service, the city must do the same thing, in at least the same degree, as far as this may be practicable without impairment of the public service."

Following Senator Fuller's address a resolution was offered by Col. J. J. A. Powell, of Norfolk, which was unanimously adopted whereby the league went on record as "considering it unpatriotic and uneconomical for any town or city to begin any public improvements which are not absolutely necessary during the present national crisis."

At the Thursday morning session, Frank Talbott, of Danville, delivered an address on municipal ownership of public utilities which proved of great interest to the city officials attending the convention, as Danville takes the lead in the state in owning public service utilities. Dr. Roy K. Flannagan, chief health officer of Richmond, followed with an address

(*Continued on page 416.*)

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

A WATERWORKS SYSTEM is to be built by Attica, Kans. Plans are being prepared by the firm of W. B. Rollins & Co.

A WATERWORKS SYSTEM is to be built by McLaughlin, S. D. Plans and specifications for the improvement were made by W. C. Buck.

In improving its WATER WORKS, Wappinger Falls, N. Y., has the consulting engineering services of Henry W. Taylor.

A WATERWORKS SYSTEM is to be built by Hoskins, Neb. H. T. Tracy is the engineer to prepare plans for the improvement.

Charleston, Miss., is to construct a WATERWORKS SYSTEM. Plans and specifications for the improvement are in course of preparation by Xavier A. Kramer.

A SANITARY SEWER SYSTEM is to be built by West Minneapolis, Minn., plans and specifications for the improvement having been completed by J. F. Druar.

The town of Richland, Ore., is to construct a WATERWORKS SYSTEM according to plans and specifications prepared by the consulting enginner, P. H. Dater.

WATERWORKS and SEWERAGE SYSTEMS are to be built by Chamblee, Ga. The city is having plans and specifications for the improvement prepared by J. B. McCrary & Co.

Great Falls, Mont., has realized the need of a CITY PLAN to control its development. The planning commission has retained as its experts to make a survey and prepare plans and schemes, A. U. Morell, of the firm of Morell & Nichols.

A trunk SEWER is to be built by Michigan City, Ind. The consulting engineer for the work is W. S. Shields.

Lowndes county, Haynesville, Ala., is making preliminary surveys for a 20,000-acre drainage project. The engineer is J. R. Scott.

Twin Falls, Ida., has retained as experts the firm of Burns & McDonnell to make an appraisal of the WATERWORKS SYSTEM.

Wynne Wood, Okla., is to build a SANITARY SEWERAGE SYSTEM. Plans are being prepared by the Mackintosh-Walton Co.

Yalobusha County, Coffeeville, Miss., is to construct about 15 miles of HIGHWAY. The engineers for the improvement are the firm of Johnson & Johnson.

A WATERWORKS SYSTEM to cost about $25,000, is to be built by Du Bois, Ida. Plans are in course of preparation by the consulting engineering firm of Cotton & Wilson.

STREET IMPROVEMENTS are to be made by North Olmsted, O. The Lander Engineering Company has prepared plans and specifications for the work.

San Fernando, Cal., is soon to vote on the proposition to issue $130,000 bonds for a WATERWORKS SYSTEM. The engineer for the improvement is A. L. Sondregger.

A new WATER SUPPLY has been found necessary by Hobart, Okla. A system to cost $100,000 is proposed and the city has retained the Benham Engineering Company to investigate and report and also to supervise construction if the bond issue is approved by the citizens.

PERSONALS

Baumgras, Ed., chief of the Paris, Texas, fire department for the past five years, has resigned.

Booth, E. M., state highway engineer of Idaho, resigned recently to enter the army engineering service. His resignation will take effect November 1. Herman C. Allen of Wallace has been elected to succeed Mr. Booth.

Colby, Elmer E., died very suddenly while inspecting bridges in Grady Co., Okla., September 27. Mr. Colby was one of the most widely known engineers in the Southwest.

Cook, L. R., has been appointed city engineer of Nampa, Ida., succeeding Ogden Dutcher, who resigned recently.

Guernsey, F. W., has been appointed city engineer of Dayton, Wash.

Lovering, Henry M., has resigned as water commissioner of Taunton, Mass. Mr. Lovering had held the office since 1880 and his resignation, which was necessary on account of ill health, was accepted with regret by the Taunton Council. Former Mayor W. K. Hodgman has been elected to succeed him.

Montgomery, O. R., has been elected police and fire commissioner of Fort Worth, Texas.

Pafford, H. M., has resigned as city engineer of Waycross, Ga.

Peck, Frank S., has been appointed highway engineer for the South Dakota highway commission.

NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

ELECTROMOBILE TRUCKS.

Industrial Dump Trucks Adapted to Construction Service.

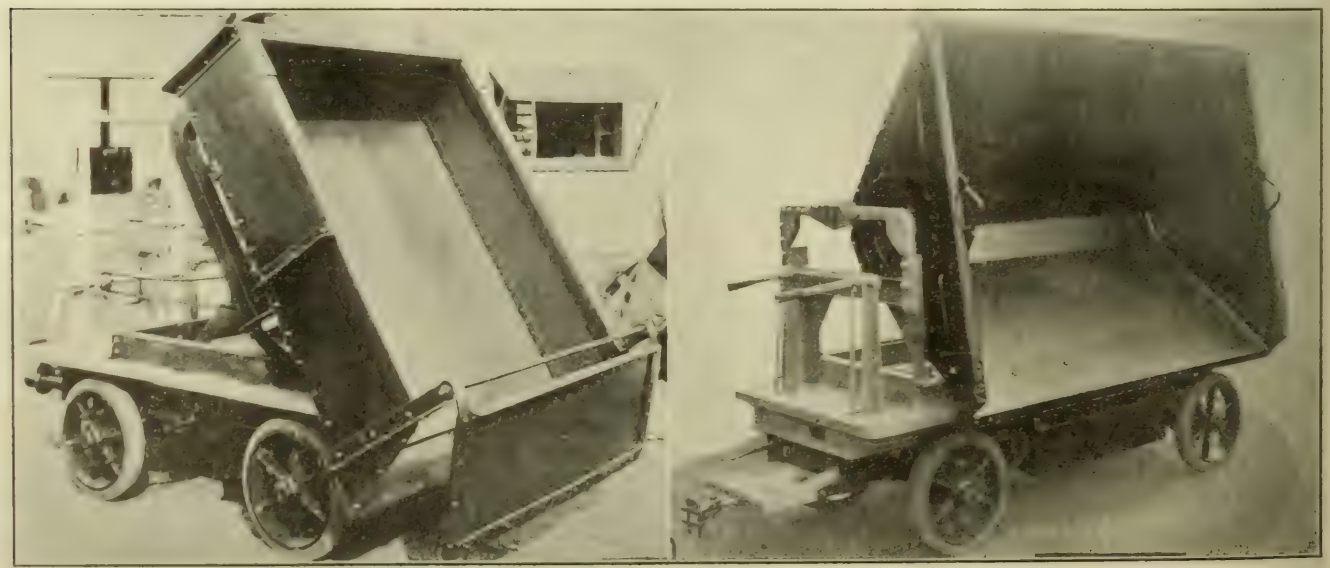
Where construction operations cover a big area, as in road or sewer work, some progressive contractors and public works officials are finding the industrial truck particularly well adapted to efficiency and economy in handling materials along the line of the job. These trucks are made with a variety of bodies and can be used to handle asphalt, stone, paving blocks, sand, pipe, etc. Their use eliminates unnecessary bother to the big motor trucks and reduces considerably the carrying and pulling by hand, which takes so much time and labor. Stores of material can be kept centralized and protected, and distributed evenly, neatly and quickly over the job when needed.

The Electromobile storage battery trucks are designed and built for such service, and it is claimed that one tractor and six trailers will do the work of three carrier or elevating platform trucks and cost less, and the tractor need never be idle. The truck is operated by a storage battery, mounted under the platform in a cradle hung between frame side channels. Current from the battery is supplied to an electric motor hung between pipe spacers upon a shaft extending across the frame. A Morse silent chain drive connects the motor pinion with a gear affixed to a differential, which joins a countershaft in one unit. This countershaft is supported by three hangers suspended from a second shaft extending across the frame. These hangers are split and bolted together so the countershaft may be taken out of the truck without necessitating removal of the hangers. In each of these hangers is an S-K-F self-aligning ball-bearing in a dustproof mounting. A small sprocket at each end of the countershaft serves to drive the chain to a larger sprocket, bolted through a boss, cast on spokes of two rear wheels. A special construction allows an independent adjustment of the side chain. The adjustment of chain between motor and countershaft is independent of the side chain adjustment by means of a strong and novel construction.

Riveted to the side frames of the truck, over each axle, are two malleable iron pedestals, and located in each of these pedestals, supported upon seats on axles, are spiral steel springs of ample size and strength to take care of all weights and road shocks that may be presented. A load on the truck causes these pedestals to compress springs and to move in slots formed by the spring seat on axles. The rear axle is round—of large section; the front axle of I beam section, with steering knuckles at each end. Special steering arms are held by nuts in these knuckles and are joined by steering cross rod behind axle. A steering ball, rods and bell crank arrangement is connected to a lever, which steers the truck by a movement upward and downward. A second similar lever, connected to a large sector and gear on controller, with a slight upward and downward movement, causes the truck to move forward or backward at four different speeds.

The truck, however, cannot be started unless the operator stands upon foot pedal, conveniently situatedof 7 miles per hour. Timken bearings on the platform. This is effected by means of a spring which normally holds tight a brake band on the drum of the differential and a lever controlling a switch contact with the motor. The simple act of raising the foot off of the pedal disconnects the circuit sets brake and stops the truck, and at the same time locks the pedal so that the truck cannot be started again at the speed stopped by again stepping on the pedal. By raising the foot slightly when in operation the truck can be caused to move at any speed by means of electrical contacts, governed by the pressure on the foot pedal. The truck has ample capacity for a full day's work on one charge with a single battery. Batteries are operated in series, eliminating any possibility of cells in one-half of battery being out of balance with those of the other half, as is often the case when batteries are operated in series-multiple. The first and second speeds only of truck are made by using resistance, and these speeds are seldom used.

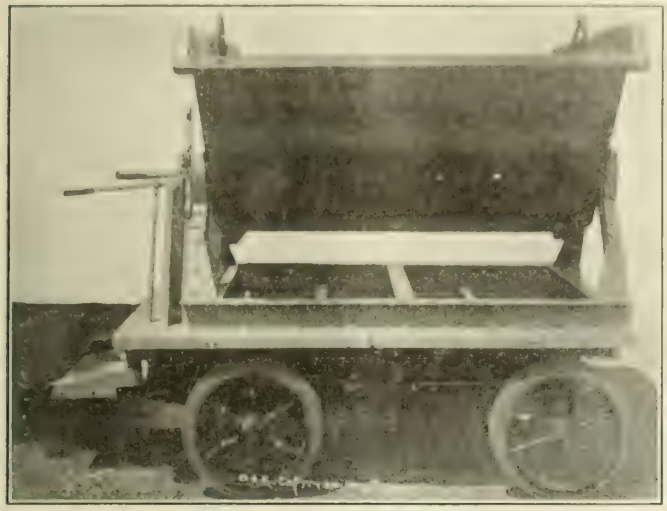
The Electromobile truck is built in a number of sizes and types. Types A and C go at 5 miles an hour and turn in small radius, being adapted to service in limited space. Types B and D are used where space is not an important consideration. The trucks are capable of carrying 3,000 pounds, or of pulling behind 10,000 pounds. Trucks of 4,000 pounds carrying capacity are built where desired. Type E is used as a tractor, and it is constructed with the batteries mounted on top and with a very small wheel base. It will push 15,000 pounds and operate with a load on grades. It has a maximum speed



END DUMP BODY, TYPE A ELECTROMOBILE. V-SHAPED DUMP BODY ON TYPE D-S ELECTROMOBILE

solid rubber Goodrich tires, Wagner motor and controller and Exide thin or Ironclad storage batteries are standard equipment.

One of the accompanying illustrations shows a standard 36 cubic foot, V-shaped, Koppel dump body, mounted on a standard type A Electromobile. The capacity of this truck is 3,000 pounds and speed, five miles per hour. Inside length is 4ft. 8½ ins.; height, from ground over side, 3 ft. 2 ins.; width, over all, 5 ft. 3 ins., and dumping angle, 40 degrees. Another



STANDARD 36-CUBIC FOOT V-SHAPED DUMP BODY ON TYPE A ELECTRO-MOBILE.

of the cuts shows a 56 cubic foot, V-shaped dump body (in the dumping position), mounted on a type D-S Electromobile. The capacity of this truck is 4,000 pounds, and the speed, 7 miles an hour. The third illustration shows a 27 cubic foot end dump body, mounted on a type A Electromobile. The capacity of this truck is 3,000 pounds, and the speed, loaded, is 5 miles an hour. The end dump body is particularly used for handling heavy materials which have pronounced adhesive qualities. Materials up to 170 pounds per cubic foot may be hauled. The dumping arrangement is simple and efficient, consisting of levers operated by sprockets and chains. After reaching the 60 degree angle the body recedes if the operator continues turning the crank, thus eliminating possibility of the body falling off. Another type of truck is especially adapted to concrete sidewalks and curbing and similar work where a side discharge body is desirable. In concrete work it provides a constant supply of material without moving the mixer. The dumping angle is 35 degrees, and the capacity 40 cubic feet.

All Koppel special bodies are self-clearing, and it not necessary to rake out or shovel out the material. It is not necessary for the driver to leave the platform to dump the bodies. Dumping is accomplished from the platform by a simple and trouble-proof mechanism. Lifting hooks on each end of the body permit it to be removed easily for access to batteries through special door in platform.

The Electromobile is made by Orenstein-Arthur Koppel Company, Koppel, Pa.

ROAD SCARIFIER.

Port Huron Attachment for General Purpose Roller.

The scarifying attachment shown in the accompanying illustration is designed for attaching to a general purpose roller for scarifying old road material before laying new material. It consists of a cross-beam hinged to and drawn by the rear axles of the roller, and extending across the rear of the engine platform. Mounted on this cross-beam is the so-called head, containing the picks. The scarifying width of the head with full set of five picks, is 28 inches. The beam is an I-beam, 10 x 5 inches and 8 feet long. The head can be moved to, and held at, any position on the cross-beam that may be desired. A lock pin holds it in adjusted position. It is adjustable to full width of roller track.

This scarifying attachment is raised out of the ground by a steam cylinder, and is lowered by gravity. Arms or levers containing adjustable weights are provided for holding the picks down when in operation. An adjustable shoe limits the depth scarified. The scarifier is quickly and easily attached, to or removed from, roller.

Compared to hand picking this attachment will save much time and hard work. There is also a considerable saving in material. None of the old material is wasted. The scarifier simply loosens up the old material, leaving it in condition to unite with any new material that may be added, and ready for rerolling.

Picks are set at a sharper angle than is the usual practice with scarifiers. This sharp angle, 45 degrees, causes lighter draft and greater lifting power. It also tends to wear the picks sharp, instead of dulling them quickly, as occurs when picks are set a lesser angle. The distance from center to center of picks is 7 inches. The picks are 2 x 2 x 16 inches and of Black Diamond steel. There are points on both sides of the pick, which is therefore reversible.

The axle draw bars are steel channels, 6 x 2 inches, 6 feet 7 inches long.

The scarifier is in the comprehensive line of road equipment made by the Port Huron Engine and Thresher Company, Port Huron, Mich.

PORT HURON SCARIFYING ATTACHMENT FOR ROAD ROLLER.

INDUSTRIAL NEWS

Cast Iron Pipe.—Prices remain at the same level after the big drop of $15 per ton on all sizes, recently announced. Since the Federal regulations are effective until January 1, 1918, no further decrease is expected until then. It is expected that cities will begin asking for bids for future needs. Quotations: Chicago, 4-inch, class B and heavier, $53,50; 6-inch, $50.50. New York, 4-inch, class B and heavier $53.50; 6-inch, $50.50. Birmingham, 4-inch, class B and heavier, $48; 6-inch, $45; class A, $1 extra.

The Austin Manufacturing Company, Chicago, Ill., published in last week's issue of Municipal Journal a full-page advertisement, calling on experienced operators of Austin motor rollers, gyratory crushers, elevating graders and other road machinery to join the United States army in France. The War Department has shipped sixty Austin motor rollers and a lot of other Austin equipment to France, and men are needed to operate these and the machines which will probably follow. The advertisement is a splendid example of a manufacturer's service to buyer and is a laudable exhibition of practical patriotism.

The Walter A. Zelnicker Supply Company, St. Louis, Mo., has recently secured the services of Mr. W. H. Bramman, who is acting in the capacity of assistant to the president. Mr. Bramman, before becoming associated with this company, was connected with the American Carbon and Battery Company.

The Ransome Concrete Machinery Company recently held its annual meeting at its Dunellen plant at Dunellen, N. J., and the Queen City Hotel, Plainfield. The officers of the company, representatives sales agents and a number of guests were present. The souvenir and program of the event was beautifully printed in two colors, with an embossed gold-lettered cover. The frontispiece was an excellent portrait of Ernest L. Ransome, founder of the company. The booklet contains patriotic songs, with Ransome "boost" songs sung to popular tunes.

NEWS OF THE SOCIETIES

(*Continued from page* 413.)

on health problems of cities and towns of the state.

In discussing municipal ownership of public utilities, Mr. Talbott declared that he believed in municipal ownership of any utility that used the public streets and alleys. He added, however, ownership of public utilities depended in a measure upon local conditions, and two important features, service and economy.

He declared economy of operation should be measured by the rate charged to customers and by the returns to the city treasurer. Some people, he stated, thought the municipality should charge the same rate as is charged by privately owned corporations, and the remainder reverted to the city treasury for public improvements. He stated he did not believe in this, as it would not be fair to the consumers to pay for improvements enjoyed by the non-consumer.

He declared there are certain natural monopolies, where there is not room for two corporations. Public service utilities recommended by Mr. Talbott to be owned by the cities and towns were waterworks, electric and gas plants, ice plants, street railways and telephones. He declared if he had these plants under municipal ownership in any city over 20,000 inhabitants, he could operate the city without taxes.

He said under municipal ownership better service and lower rates can be obtained provided the right man is secured for the position as manager. He stated that a job should be created and a man found and then the salary fixed, instead of the salary being fixed before the man is found.

In any business, where the public health is affected, he stated, it should be under municipal ownership and should not be worked for profit. He stated that if the cities took charge of the milk supply, the death rate will make a big drop.

A municipal utility, he said, can not be operated successfully unless a man is found who is large enough to fill the position. He stated there were more butchers and bakers and $1,000 clerks filling positions as $5,000 city managers and executives under the commission form of government at present than ever before.

He declared it was just as dishonorable for a city to allow a man to render service valued at $10,000 and pay him $5,000 as it is for a man to get $5,000 for service worth $1,500.

Mr. Talbott took a rap at the coal dealers and expressed the opinion that after the war the Government will take a hand in producing and distributing coal unless the coal dealers see the handwriting on the wall and change their practices.

Mr. Talbott recommended short leases with the privilege of recall, rather than perpetual franchises for public utilities.

He stated that water was being furnished at the rate of $4 per year and the water department made a profit of $20,000 annually. Gas is being furnished citizens of Danville at 90 cents per 1,000 cubic feet, with 50 cents minimum charge, and profits from the gas plant was $25,318.32 last year.

He stated Danville was the first city in the United States to own and operate an electric plant, and last year the plant made a profit of $52,000. Profits from three municipal plants last year was $97,499.23. Added to this, he stated, should be $75,000 saved the consumer in lower rates and the profits will reach $175,000. Within ten years the city will make a profit of one million dollars and the physical value of the plants is only one million dollars.

He stated he could take any street car company in any city of 20,000 or over and operate the system on a 3-cent car fare rate and make money.

He told of the ice monopoly in Danville, in which he stated an old company was giving poor service at high prices and a new man opened a plant and cut prices. Finally the prices dropped to $3 per thousand, and the old company cut to $2 per thousand to drive the new man out of business. The new man appealed to the public to stand behind him and prevent the old company from crushing him out of business, and the public responded. The next year the old company bought the output of the new company and started back with poor service and high prices.

Mr. Talbott stated the city council appointed him to investigate the possibility of starting a municipal ice plant. He made an investigation and he found that with an expenditure of $50,000 he could start an ice plant and sell ice at a profit at $3 per thousand. The ice company came to the city and made a compromise at $3.50 per thousand and since then was allowed to raise the price to $4 per thousand. Danville was kept out of the ice business temporarily, he stated.

He stated public utilities owned by the city brought the city of Danville $97,499.23 last year, against $6,054.78 brought in by the privately owned corporations serving the public. This, he stated, showed the importance to the city of municipal ownership.

Dr. Flannagan in his talk declared that only five cities in Virginia had regular health officers devoting their entire time to health work of the city —Lynchburg, Danville, Roanoke, Richmond and Norfolk. He declared that every city and town in the state should have a person employed to guard the health of the community.

He stated that in towns that cannot afford health officers, a sanitary inspector and a nurse should be employed. He declared if both cannot be employed a public health nurse should be put in charge.

He said that physicians giving part of their time to health work were not satisfactory. A health officer does not necessarily have to be a medical man, but on the contrary men who are not M.D.'s make better health officers as a general rule. He declared health work and the work of a physician are directly opposed to each other. He advised that a layman be employed and given training for the work of the health department in small towns.

Southern Commerce Congress

The ninth annual convention of the Southern Commercial Congress was held at New York City, October 15, 16 and 17, the sessions opening with a meeting Monday morning at the Hotel Astor. Sessions were held at the Astor and the McAlpin on various subjects. Tuesday morning at the Astor, there was a good roads meeting at which speeches were made by H. B. Varner, editor of "Southern Good Roads," Gen. T. Coleman DuPont, George Diehl, Edwin Duffey, New York Highway Commissioner, and A. G. Batcheldor, of the American Automobile Association.

At the afternoon roads session, the speakers were: Judge T. E. Patterson, chairman of the Georgia Highway Department, Rodman Wiley, of the Kentucky Road Commission, W. S. Fallis, State Highway Engineer of North Carolina, and H. G. Shirley, Chief Engineer of the Maryland Roads Commission.

Municipal Journal

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THE CHOUTEAU AVENUE VIADUCT

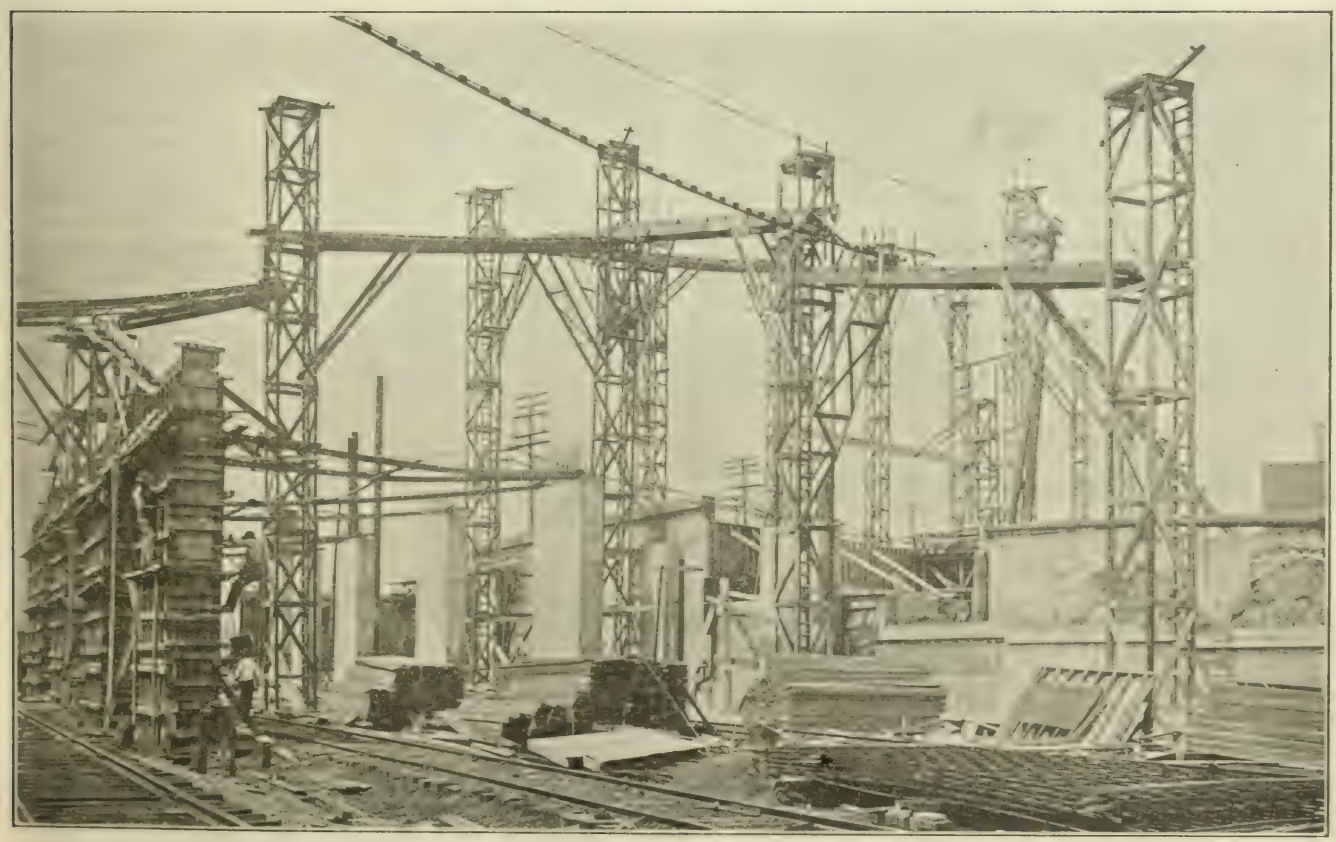
Inclined Approaches Along Viaduct from Bottom of Valley Spanned—Vehicle Subway Under One Side of Floor—Provision for Expansion—Delivering Concrete from a Central Plant.

By W. E. HARDENBURG.

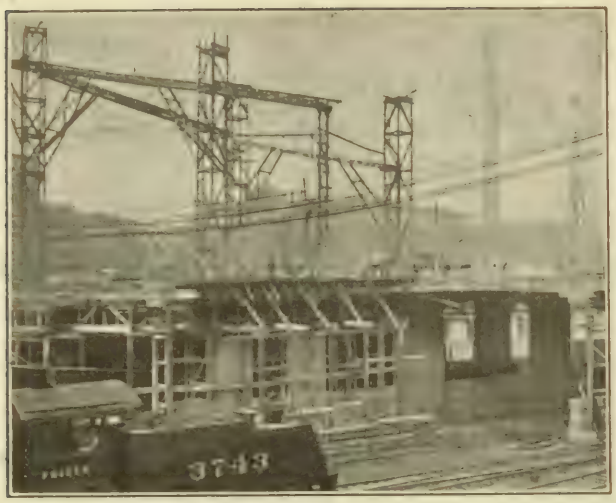
A viaduct was completed in St. Louis in September of this year which exhibits a number of novel and interesting features. This viaduct carries Chouteau Avenue over the tracks of the St. Louis & San Francisco and the Missouri Pacific railroads, eliminating a dangerous grade crossing over the latter and replacing a smaller bridge over the former. The construction of the viaduct has permitted the St. Louis & San Francisco railroad to increase its number of tracks from four to eight.

The viaduct extends from a point just east of Vandeventer Avenue eastward to the west line of Tiffany Street, a total distance of about 1,500 ft., of which about 650 ft. is in embankment. The west half has a grade of 3.2 per cent and the east half a grade of 0.9 per cent, which grades give a clearance over the railroad tracks of 22 ft. The viaduct is 80 ft. wide, of which 56 ft. is roadway containing two street railway tracks, with a 12-ft. sidewalk on each side. Near the west end, Pacific Avenue intersects Chouteau Avenue at right angles and from here a roadway and sidewalk are carried along the south side of the viaduct in each direction, rising on a flat grade that follows practically the surface of the ground, and are connected with the viaduct proper near the east and west ends thereof, as shown in the plan on the next page.

There are two embankments, one the approach at the west end, the other a section about 200 ft. long just west of the St. Louis & San Francisco tracks. The open sections consist of a reinforced concrete slab floor system supported by a series of reinforced concrete piers. Each



BUILDING VIADUCT PIERS AT ST. LOUIS & SAN FRANCISCO R. R. TRACKS.
At the left, completing forms for a pier. Wooden towers are for supporting concrete-distributing chutes.



SIDE VIEW OF VIADUCT, SHOWING CONSTRUCTION OF PIERS.

pier consists of a bent of three columns, all the bents being at right angles to the line of the viaduct except those at the railroad tracks, which are placed at a skew, the angle of which is determined by that of the tracks, being 58° 24′ in one case and 61° 50′ in the other. The bents in the normal sections are spaced 27½ ft. center to center, and in the skew sections about 35 ft. The three columns in each pier are spaced 27½ ft. between centers. In all there are 31 piers, or 93 columns, and 4 abutments. An expansion joint is provided at each abutment, and three additional ones were located as shown on the plan.

One side of the embankment section between the two railroad rights-of-way (which was substituted for pier construction because of the elevation of the ground at that point) had been used as an approach to the Independent Packing Plant, which is located just north of the viaduct, and for the accommodation of this plant a traffic subway 22 ft. wide and 12½ ft. high was constructed immediately under the entire north side of the viaduct. (This is shown in the plan by dotted lines.) The floor of the viaduct at this point forms the roof of the subway, and is supported on the north line by a row of piers 19 to 29 ft. apart, depending upon the location of the entrances to the packing plant. This subway is paved with brick.

The roadway from Pacific avenue westward to join the viaduct connects with this on the approach embankment. That rising eastward connects with the viaduct over the tracks, and a side deck is provided here, supported by two additional piers in each of three bents.

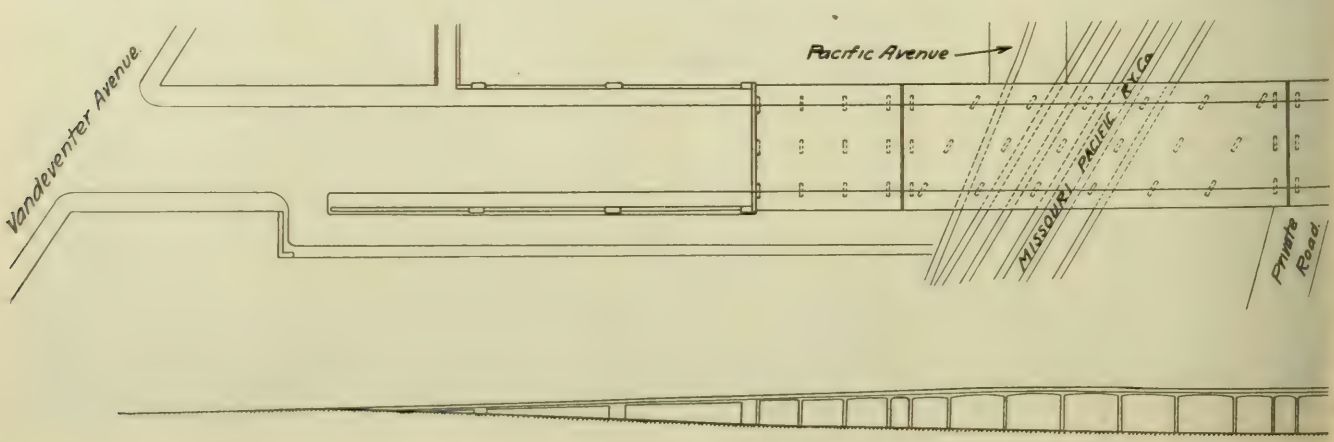
The embankments are contained between counterfort retaining walls 2 ft. 3 in. thick and reinforced with ¾-in. round bars laid horizontally. The abutments are similar in construction. Each pier column is 2 ft. thick and 9 ft. measured transversely of the bridge, except at the west skew section, where they are 10 ft., and the east skew section, where they are 9½ ft. Each pier is reinforced with 22 round vertical bars, 1-in. to ⅞-in. thick, depending upon the height of the pier. Where the skew bents and normal bents adjoin, the two come together at one end so as to give the appearance there of one normal pier. The viaduct deck does not rest directly upon the abutments, but upon a set of pier columns which are placed within a minimum of 2 in. from the abutment, the interval serving as an expansion joint. The foundations of the piers extend to bed rock, which is found at depths varying from 8 ft. to 56 ft. At Pacific avenue and around the approach to the subway the piers are protected by traffic guards edged with iron 2½ ft. high and projecting outwardly 14 in. all around.

The deck of the viaduct is of continuous flat slab construction, the slabs being 20 in. thick in the middle of each span and 24 in. over the piers in the normal construction, and 22 in. and 27 in. respectively in the skew construction. That portion over the subway consists of a 10-in. slab supported between reinforced beams 2 ft. wide and 32 in. deep, spaced 10 ft. between centers.

Underneath each sidewalk is left a channel 6 ft. by 8 in. in which to place pipes and wires of the public utilities. Descending from each sidewalk at the Missouri Pacific tracks is a stairway, giving quicker approach to the viaduct from Pacific avenue than by following the inclined roadways. These stairways are of reinforced concrete 5 ft. wide, with 2-in. iron pipe hand-rails, and treads ready cast from designs worked out by a local contractor.

The guards along the outer sides of the viaduct consist of brick walls 12 in. thick, capped with a stone 5 in. thick, the whole being 42 in. high. At intervals, over piers when possible, post effect is given to the wall by slight projections in the brick work 30 in. long. The roadway is paved with wood block.

The viaduct is lighted by 34 lamps supported by posts which also support the trolley wires. These posts are of reinforced concrete 21 ft. high, 12 in. in diameter at the base and 5 in. at the top. They are reinforced with four 1⅛-in. bars around which wire is wrapped. Inside each post are a 2-in. pipe that carries the gas and ½-in. pipe for the pilot. Bronze lighting fixtures are attached near the tops of the posts and the span wires which support the trolley wires are fastened just above these. The posts cost $82 each and the lighting fixtures $180 each. The posts were designed by the city and made by a local contractor, and the bronze brackets were manufactured especially for this purpose.



GENERAL PLAN OF VIADUCT, AND PROFILE

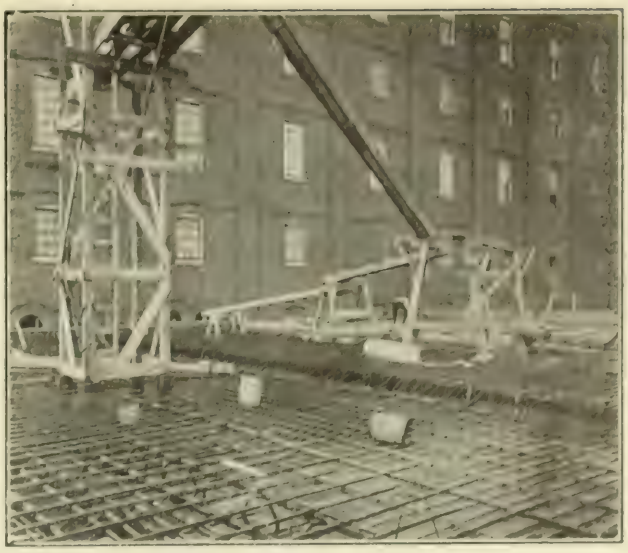
CONSTRUCTION METHODS.

The construction involved about 15,350 cu. yds. of concrete, the principal other items being the wood block pavement of the roadway, which costs $32,466, the lamp posts, brackets, sidewalks, etc. The total of all the contracts was $199,703.

Excavation for the pier foundations was in most places through a mixture of clay, loam and sand, although quicksand was encountered at one place, and here Lackawanna steel sheet piling was used, and a small pump for dewatering the excavation. Excavation down to a depth of 35 ft. was performed by 2 men digging and 2 men removing the dirt by a windlass. Where the depth exceeded 35 ft., a small hoisting engine was employed. Excavations were carried down at an average rate of 5 to 7 ft. a day. The contract price for excavation was 8½c. a cubic foot.

Three grades of concrete were used in the work, that for the deck being mixed 1:2:4, that for the walls, abutments and piers 1:2½:5, and that for the deep foundations 1:3:6. All the concrete was mixed at a central plant about 200 ft. west of the St. Louis & San Francisco tracks and distributed by the tower and chute method. The concrete plant consisted of two ¾-yd. mixers and its capacity was estimated at 20 cu. yds. an hour, although it frequently ran up to 25 cubic yards. The specifications required that the concrete be mixed for 3 minutes. The materials were brought to the plant in cars. Both mixers discharged the concrete into a single pit at the foot of a main hoisting tower, where it was received in a bucket in which it was carried up the tower and discharged into chutes that led to all parts of the viaduct within a radius of 450 ft. As the western end was more than this distance from the mixing plant, the concrete used near and west of the Missouri Pacific Railway tracks was lifted by a second hoist and discharged into a second set of chutes covering the remaining 500 or 600 ft. All fixed chutes were given a slope of 8½ on 40. They were about 9 ins. wide and 9 ins. deep and were supported at 40-ft. intervals by towers 4 ft. square, built up of 4 by 4 timbers. The two hoisting towers were 7 ft. square and built up of 4 by 6 timbers. The hoisting equipment at each of the two towers consisted of two electric motors, one a direct current and the other an alternating current. As far as possible, walls and slabs were built in monoliths containing all of the concrete mixed during the 8 to 11 hours of continuous work, or about 200 cubic yards.

Toward the total cost of the viaduct proper, nearly $200,000, the Missouri Pacific Railroad contributed $155,000, the St. Louis & San Francisco $35,000, and the local traction company $10,000. The work was, however, carried on under the direction of the city. In addition



REINFORCEMENT OF FLOOR SLAB

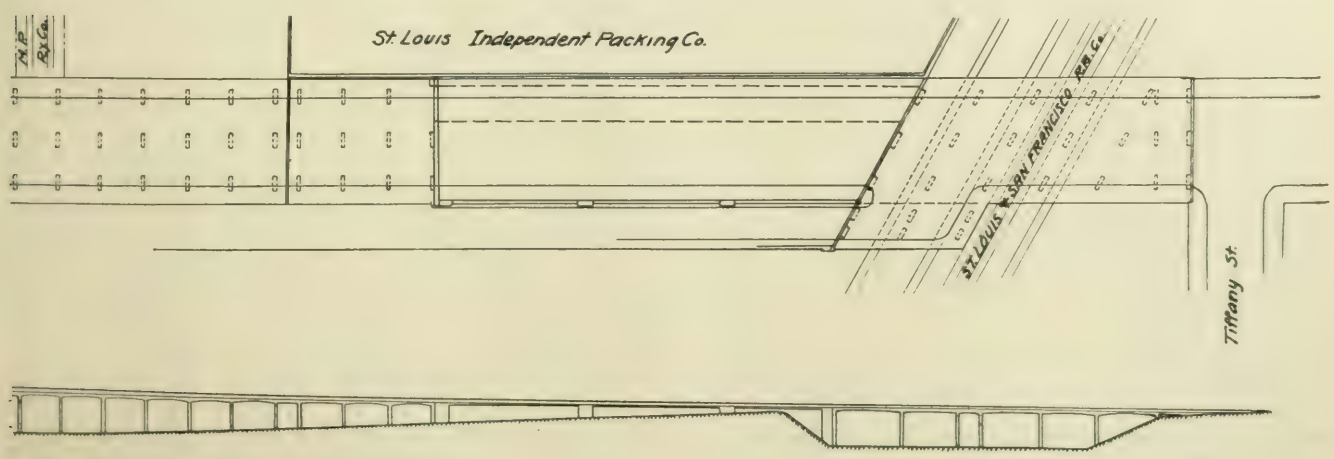
Concrete-distributing chutes resting on portable supports in background.

to this, $15,818 was spent in paving a part of Pacific avenue and the 22-ft. roadway connecting it with the viaduct, which sum was prorated between the city and the adjoining property owners. The contractor for the concrete and the guard walls was the F. C. Mueller Co.; for paving the viaduct roadway, the Heman Construction Co.; for the other paving, the Skrainka Construction Co.; for the concrete lamp posts, the Unit Construction Co.; for the bronze light brackets, the American Foundry & Mfg. Co., and for the walks, J. Herckert.

The work was in charge of L. R. Bowen, chief of the Bridge Division, Department of the President, Board of Public Service of the city of St. Louis. C. W. Martin was in charge of the design, and W. R. Crecilius was in charge of construction. The author is indebted to the last for the information given above.

ELECTRIC LIGHTING IN SIOUX FALLS.

During the six months from April to September, 1917, inclusive, Sioux Falls, S. D., used in its street lighting 161 ornamental luminous-arc lamps of 6.6 amperes at a total cost of $3,187.47, or $19.80 per lamp. During this time there were used 1,212 electrodes or about 7½ electrodes per lamp during the six months. There were also replaced 47 globes, indicating an average life of something more than 20 months per globe. The labor varied from $60 to $65 a month, averaging $62.85 a month, or about 39 cents per month for each lamp. Maintenance



OF VIADUCT AND OF GROUND SURFACE.

cost a total of $2,557.34. This does not include the cost of current, which was generated by the city plant. Of this, 71,788 kwh. were consumed during the six months.

The plant used for generating the current contains three Diesel oil engines rated at a total of 840 hp., three Kinney boilers rated at 700 hp., and an Ideal engine rated at 125 hp. There were four dynamos having a total capacity of 641 kw. Oil was used for fuel costing 5c a gallon, and 100 gallons generated 1,000 kwh., making the cost of fuel 0.5c per kwh.

SEWAGE TESTING STATIONS

Suggestions for the Construction and Operation of Such Stations—Building Tanks and Other Apparatus—Selecting Machinery—Cost of Stations.

Under the title "Experimental Engineering, Particularly the Construction of Testing Stations on Water and Sewage Problems," Langdon Pearse, division engineer in charge of sewage disposal investigations for the Sanitary District of Chicago, some weeks ago delivered a lecture as one of the J. E. Alfred Lectures on Engineering Practice, which gave a number of suggestions, both general and in detail, which should be of great value to engineers who are considering or engaged in the construction and operation of experimental sewage treatment works. While the title and the first few paragraphs suggest that experimental engineering generally is to be treated of, the author devotes practically all of his attention to sewage treatment work, the reason given being that at the present time most of the experimental work being carried on is of this nature. Some of the more interesting and valuable suggestions made by the author are quoted or abstracted below.

"A testing station is a collection of apparatus designed to demonstrate or ascertain principles under conditions where precedent does not clearly apply. . . . The final accomplishment is to indicate how a given problem may be solved at lowest cost to meet the necessary conditions." An engineer facing the expenditure of large sums of money wants to plan along safe lines and when experience indicates that previous work or conditions are not a safe guide, actual tests that duplicate the real conditions are made and from them are deduced engineering constants and the critical factors in design or process.

The testing plant should comprise a full size working unit if possible, or at least a considerable fraction of such a unit. If this is not possible, critical features should be studied. For designing and constructing the plant the following suggestions are important:

1. Use standard materials to expedite construction.
2. Keep the cost low and provide that changes may be made as inexpensively as possible.
3. Design so that removal and dismantling of the plant may be easy.
4. Provide flexibility, so that changes in arrangement and control may be made readily.
5. Provide a moderate number of sampling points, thus making control easy, but not too automatic.

As to materials, the cheapest material which will last during the probable life of the testing station is the best. Wood and sheet iron may be used where concrete or other more permanent material would be essential for permanent works.

The author takes up the several units of a sewage experimental plant, giving suggestions concerning each. For tanks he suggests using wood for large ones and galvanized sheet iron for small ones. Wooden tank floors should be supported at frequent intervals, and if buried in the ground, adequate provision must be made to resist earth pressure. On soft ground, footings should be of heavy plank, well-crossed, to make the settlement uniform. It is desirable to have a regular tank manufacturer construct the tanks, as he is equipped to handle this work expeditiously and can probably secure water-tightness at minimum cost. Circular tanks are usually made of Oregon fir, or of redwood on the Pacific coast. Rectangular tanks may be made of Oregon fir or even yellow pine. The largest rectangular tanks the author has seen were a set of three, each 40 ft. long by 7½ ft. wide by 9 to 10 ft. deep, built of 3-in. yellow pine and bolted through every 20 ins. in the sides and bottom. The sides were held in place by buck-staves tied together by bolts through the tanks. Rectangular tanks have sometimes had galvanized iron lining or a lining of tarred roofing paper between two layers of planks. Inside of these tanks false bottoms can be made of any form required by using tile faced with concrete. These should be provided with vents for air and water and protected from freezing by banking earth outside or otherwise. For small iron tanks and orifice boxes, iron of No. 20 to 24 gauge is generally used, with a stiffening of iron rods or light angles if required.

In selecting machinery such as blowers, pumps, motors, etc., the best stock designs should be chosen. Sturdy construction is necessary to stand up to a daily service of 24 hours a day, week in and week out. Simplicity of machinery also is desirable, for skilled mechanics are not always at hand in the middle of the night, and the men in charge must keep the plant operating at all times. Provision for lubrication must be simple and ample. In most stations pumping or other machinery has been operated by electricity, although at Akron a gasoline engine was used and at Gloversville a small water wheel. Ordinarily, alternating current motors give much less difficulty in untrained hands under continuous duty than direct current, although the latter will serve, if necessary.

The piping layout should be simple and direct. The common failing in first attempts at pipe layouts is the lack of unions and cleanouts or plugged ends. The pipe should be put together with graphite and oil on the threads to facilitate taking down. Wrought iron or steel with threaded joints is generally used for pipe under 6 ins. in diameter, while cast iron pipe with leaded joints or vitrified pipe may be used for larger sizes. In designing piping for channels where sewage or other liquids carrying material in suspension is to flow, velocities should be kept at or above 2 ft. per second in order to prevent deposit.

Lighting should be liberal at all important points where observations are required, but too many lights are to be avoided, as attendants are prone to forget to turn them off. Incandescent lamps are generally most convenient for lighting.

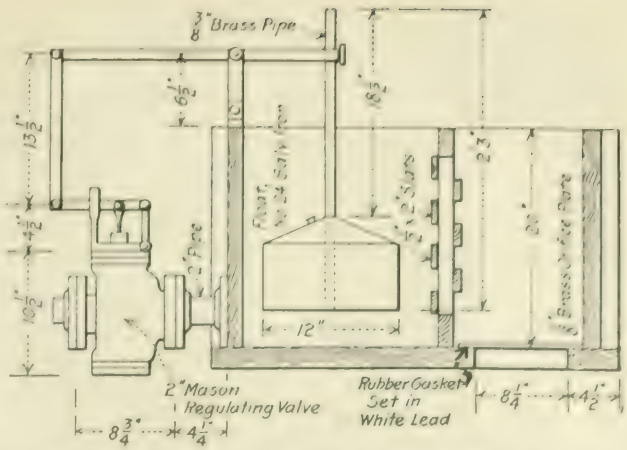
If the plant is built in a northern climate, exposed pipes or valves where water may stand must be protected from frost. Manure boxes or banking with earth may be employed. Some testing stations (as in Philadelphia) have been wholly enclosed. All measuring or controlling devices should be housed.

For measuring flow of water or sewage, standard orifices are ordinarily best for small flows, while for larger flows a V-notch weir may be desirable, and for still larger flows the usual sharp-crested rectangular weir with or without end contractions. A water meter may be used for measuring clear water, and in some cases a Venturi meter or Pitot tube may be used. Where a constant flow is desired, this is usually obtained by maintaining a constant head over an orifice or weir. This

may be effected by providing an overflow in the orifice box, or by controlling the valve on the intake pipe by a float in the orifice box or weir box. More accurate than the ordinary ball float is the home-made design illustrated herewith. The float can be counterbalanced to make the operation as delicate as desired. A good balanced valve should be used. Such orifice boxes in the control of experimental plants will maintain constant flow conditions for days, and have even been used on settled sewage. Orifices in copper or brass are found to be enlarged by corroding action. Glass orifice plates or glass tubes with an orifice drilled in the side may be used. Wherever possible, too small orifices should be avoided.

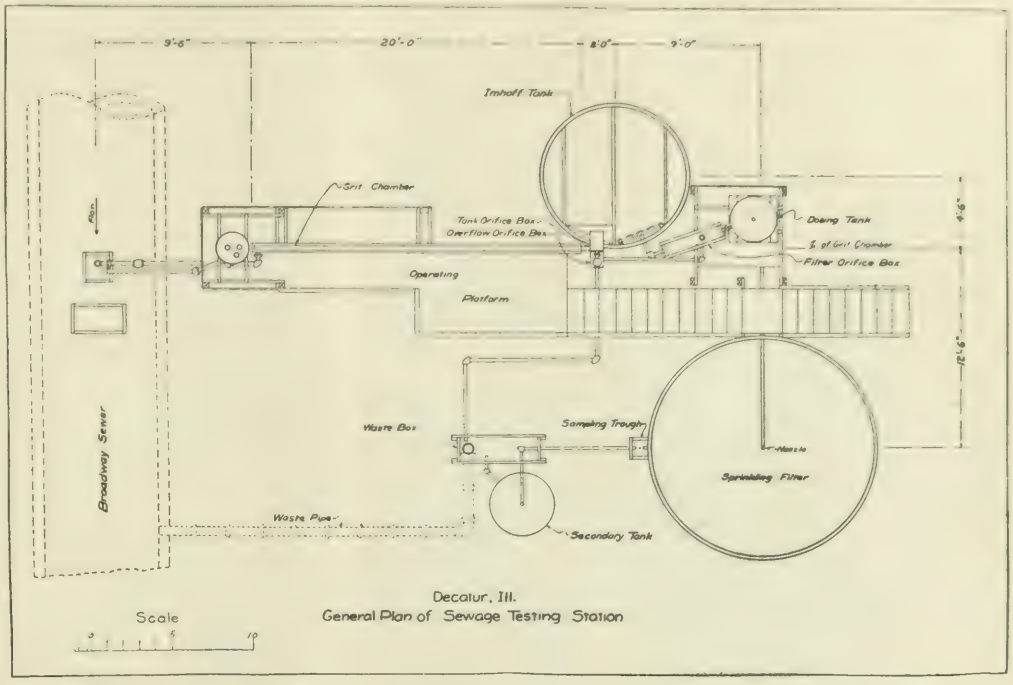
The flow of air may be measured by air meters of various types and by orifices. On small flows and low pressures, a meter of the gas type is convenient. For large flows, the Venturi or General Electric meter are of service. Pitot tubes also may be used.

Where a test is to be made upon sewage, a gravity sup-

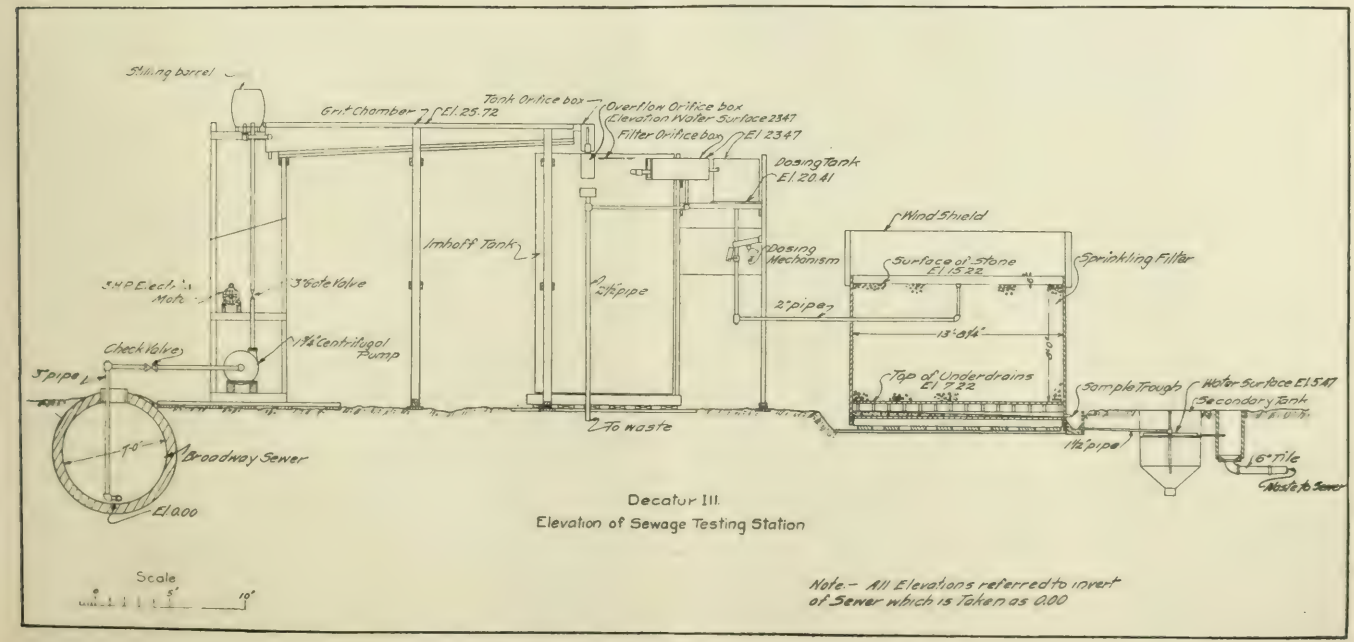


SPRINKLING FILTER ORIFICE BOXES, CHICAGO TESTING STATION.

This plant cost $1,142 erected complete, not including laboratory or its equipment. The material cost $758, labor $384. It comprised a motor-driven centrifugal pump, grit chamber, Imhoff tank, circular sprinkling filter, secondary tank, dosing device, and electric wiring. Operation for 4 months, exclusive of power and light, cost $1,560—unusually low. Treated about 75,000 gals. a day.



Decatur, Ill.
General Plan of Sewage Testing Station



Decatur Ill.
Elevation of Sewage Testing Station

Note – All Elevations referred to invert of Sewer which is Taken as 0.00

GENERAL PLAN AND ELEVATION OF DECATUR SEWAGE TESTING STATION.

ply of the liquid to be treated should be obtained wherever possible. This is seldom practicable, however, so that pumps must be used, which are usually of the centrifugal type. To protect the pumps from clogging, some method of removing the larger suspended matters is necessary. In a few stations slotted pipe strainers on flexible elbows have been used, but if the slots are fine they may remove material which should reach the plant. As a rule, bar screens with round or square bars, set vertically, with openings of ⅜-in. to ⅝-in. in the clear should protect a centrifugal pump from 1½-in. size up. The screen may be made as a box on the end of the section pipe (as at Chicago and Decatur), or set in a water way (as at the Chicago Stockyards and at Worcester), or built directly in a part of the sewer (as at Columbus and Gloversville). In the last named city the screen was made of wooden bars with 1⅛-in. clear openings, while in the other cities the clear opening varied from ⅜-in. to ⅝-in.

The author describes designs for fine screens, grit chambers, tanks and sprinkling filters, giving certain details as to slopes of bottoms, shape of filter, underdrains, etc.

Concerning the operation of these plants, he remarks that the design may be such that the control will be practically automatic, but experience shows that it is usually better to have enough work for the men in charge to do to keep them awake. On the other hand, automatic recording devices at vital points are useful as a record of and check on continuous operation.

Regular points for sampling should be designated. As a rule, composites are more instructive than individual samples. Frequent sampling is important; in general, once an hour may suffice, but in some cases samples should be taken every five minutes.

As a general rule, the best organization is to have one man in charge of both laboratory and testing station proper, with one experienced laboratory man in sympathy with experimental work at the head of the laboratory force and an active young engineer in charge of the testing station. Actual collection of samples is usually entrusted to non-technical men, but where possible it is better to have a higher grade of men, such as young technical graduates, although even these are not altogether infallible, particularly when pleasure and sleep clash with the work.

In order to permit comparison of results with those obtained at other plants, standard methods should ordinarily be followed, usually those of the American Public Health Association. Frequently, however, special tests have to be devised or short cuts worked out.

The time required for obtaining results depends on the conditions and the character of treatment required. Most municipal testing stations have operated at least 12 months to secure results throughout the four seasons of the year. From three to six months of warm weather are certainly required to establish biological processes, as in sprinkling filters, or in studying Imhoff tank sludge digestion, before real results can begin to be obtained. Where new processes are being worked out, a station may be operated for two or three years.

The author gives a list of a number of the investigations that have been made of water and sewage purification and the costs of each. These costs vary from $195,000 at Lawrence, Mass. (24 years' operation), down to $1,500 at Reading, Pa., and $2,000 at West Superior, Wis., and Richmond, Va. The first cost of the testing station at Columbus, O., including buildings and land, was about $25,000. The small testing station at Decatur cost $1,142 complete. The Milwaukee station has cost over $30,000. Over $1,500,000 has been spent on testing station work in the United States since 1888.

EXTENT OF THE RURAL ROADS.

Anything like a complete and accurate statement concerning the mileage of rural roads in the United States is impossible without an actual survey of all of these roads by some authority, since there is now no accurate record existing of a very considerable percentage of them. Efforts have been made by the United States Office of Public Roads and Rural Engineering to obtain as accurate estimates of this mileage as is possible, and that office has just issued the figures obtained by it. These figures, we understand, were obtained by applying to the county boards and asking them, when they did not already have the information, to obtain it from the various town officials.

The figures so obtained give the mileage at the close of the year 1916 as 2,455,761; this being the miles of all the rural roads in the country, of which 287,047 miles were surfaced in some way. That is, only 11½ per cent. of the roads were anything other than dirt.

The figures are classified by states, and show that of all the states, Massachusetts has the greatest percentage of its roads surfaced—476 per cent. Then follow, in order, Indiana with 42.5 per cent., New Jersey with 40.5 per cent, Ohio with 36.5 per cent. Rhode Island with 34.5 per cent., Kentucky with 23.2 per cent., New York with 22.7 per cent., Connecticut with 22 per cent., and California with 20.2 per cent. Indiana and Kentucky hold their prominent positions because of extensive use of gravel, and it is somewhat misleading to class these gravel roads with the expensive types used in Connecticut, for instance. The smallest percentages of surfacing have been done in Oklahoma, with 0.7 per cent., South Dakota with 0.8 per cent., Iowa with 1 per cent., Kansas with 1.3 per cent., North Dakota with 1.6 per cent., and Nebraska with 1.7 per cent. Here again the figures are misleading, for the excellent maintenance of many of the dirt roads of Iowa makes the riding and hauling over them very easy except during a short period in the spring, and some of these may have as much spent upon them for maintenance as some of the gravel roads in other states that are classified as "surfaced."

During 1916, $272,634,424 was spent on the roads of the country, plus statute and convict labor worth about $15,000,000, and about $15,000,000 paid as interest on road bonds, or a total of over $300,000,000. The cash expenditure in 1915 was $266,976,399, and that in 1914 was $240,263,784. While the expenditures in 1916 exceeded those in 1915 by more than $5,000,000, those of 1915 had exceeded the 1914 expenditures by $26,700,000. This slowing down of the road program in 1916 was attributed largely to labor and material conditions. In seventeen states the cash expenditures were less in 1916 than in 1915, these states including most of those in which the expensive types of construction requiring imported material are most common.

HAULING ROAD GRAVEL BY TEAMS AND TRACTORS.

Very careful records were kept recently of the cost of handling gravel for some main roads in Minnesota, which show the relative value of horse and mechanical traction under similar conditions. About 22 miles of roads had the gravel distributed over them by teams, and about 3.6 miles were covered with gravel hauled by a caterpillar traction outfit. Itemized cost records were kept so carefully that the results of these two methods of hauling can be compared.

Using teams, it was found that the cost of loading and hauling a cubic yard up to one-half a mile ranged from 57 to 94 cents per mile. Where the hauling was one-

half to one mile the cost per mile ranged from 30 to 48 cents. Where it was from 1 to 1½ miles, the cost was 23 to 35 cents, and where it was between 1½ and 2 miles the cost per mile was 22 to 28 cents. The detailed figures show that the cost depended largely upon the efficiency of the men engaged in loading the wagons. These loading costs varied from 7 to 25 cents per yard. The least figure was obtained by making the teamsters help in the shoveling and the highest figure was due to an excessive amount of frost and firewater.

The tractor outfit consisted of a gasoline-driven caterpillar tractor, seven 3½-yard spreading wagons, a 50-yard storage bin and a loading machine. The work was complicated by a very heavy grade at one place. The best that could be done here was to haul four cars across private land and then go back and haul the remaining three cars across this rough ground. A full train was then made up and hauled the remaining 2½ miles. The total average haul was about 3 miles. As the work progressed another gravel pit was opened where these grades did not exist and the hauling was done more easily. On the first part of the work the average cost was 15.4 cents per yard per mile and on the latter part it was 15.41 cents.

The engineer who reported these figures, Orrin J. Kipp, has stated that with a more powerful tractor and a loading outfit of greater capacity, a much lower operating cost could have been obtained with the tractor outfit. It is his opinion that with proper equipment, mechanical traction of this type is much cheaper than hauling by team. There are also other advantages which he has summed up as follows: By applying the gravel in two courses with a tractor, the gravel is rolled without additional cost and the road is ready for travel as soon as the tractor leaves it. Furthermore, by loading the gravel into a bin, thence into wagons and finally dumping it on the road, the material is better mixed than when it is shoveled directly from the bank into the wagons which dump it on the roads.

TRENCHING AT LOW COST.

G. R. Ensminger of Columbus, O., has recently done some water pipe trenching at what he thinks is exceptionally low cost. He used a Buckeye trenching machine with two men and dug 800 feet of ordinary water main trench a day. He figures that it would take 40 men to do the same work by hand in a day.

For caulking the pipe joints he used air pressure, stating that, while it costs the same to operate as hand caulking, it strikes a uniform blow and works faster and more regularly.

He back-filled the trench by putting traction engine wheels on his Ford and hitching it to a ditch-filler scraper. He computes a saving of 2 cents a lineal foot on the back-fill, flushing only being required for settling the trench and no tamping. The change of wheels either way was made in 30 minutes.

CLAY-GRAVEL FOR STREETS.

In his report for the year 1916 to the Committee on Streets of Charleston, S. C., J. H. Dingle, city engineer, stated that the clay-gravel roadways of that city demanded immediate attention, and expressed his opinion that it would be doubtful economy to relay them, since clay-gravel is not, in his opinion, suitable for city streets under modern conditions. He recommends the substitution of sheet asphalt, which he believes will be more economical than the wasting of money in efforts to repair the clay-gravel.

STREET CLEANING IN CINCINNATI.

The accounts of the Department of Street, Sewer and Catch Basin Cleaning of the city of Cincinnati, of which Fred Maag is superintendent, appear to be kept in excellent detail, so that it is possible to derive from them the itemized costs and also unit costs of almost any service. From Mr. Maag's report for 1916 we have selected a number of items of work done and unit costs which we think will be of interest.

Horses are used by the department in ash removal and removal of street sweepings, snow and ice, in drawing machine brooms and flushing machines and in sewer cleaning. The average amount of feed consumed by all horses, about 255 in number, throughout the year, was as follows:

Hay—14.7 lbs. per horse per day; oats—11.5 lbs.; nutritia—2.8 lbs.; and 2,200 lbs. of oil meal for the year. The total cost per horse-day was 34.9 cents. The number of horse-days devoted to each service is given for each month of the year, ash removal requiring about 60 per cent of this in winter and 40 per cent in summer. The average number of idle work-horses per day, excluding Sundays, varied from 58 to 17, and the average days per month, excluding Sundays, that each work-horse was idle, varied from 5.8 to 1.9. Excluding Sundays and holidays, the percentage of time that the horses were idle varied from about 8 per cent to about 30 per cent.

The various services performed are classified under the heads of "Flushing," "Machine-Brooming," "Street Sweeping," "White Wings," "Gutter Cleaning," "Ash Removal," "Snow Removal," "Broom Gang," "Gutter Cleaning after Flushing," "Cleaning Alleys," "Removing Weeds," "Cleaning Crossings," "Catch Basins, Inlets and Sewers," together with two or three miscellaneous services, such as maintaining dog pound. The unit employed in describing work done is a square of 16,000 square feet in the case of flushing, machine-brooming, broom gang work, alleys and weeds; squares of 400 lineal feet in the case of gutter cleaning; units of 1,000 square yards in the case of white wings, and cubic yards in the case of street sweepings, ash and snow removal.

Of flushing streets there was performed during the year 127,884 squares, on which were employed 10,493 horse-days. The labor cost per unit was 11.9c and the total cost was 24.1c with overhead. Machine-brooming was performed only during July to October inclusive and 1,059 squares were swept at a cost of 9.3c per square for labor and 22c total with overhead.

Of street sweeping there were removed 103,806 cu. yds., on which was employed 13,287 horse-days, the cost for labor being 27c per cubic yard and the total cost with overhead being 47.6c.

The white wings cleaned 120,842 unit squares of 1,000 sq. yds. each at a cost for labor of 30.5c and 35.2c total with overhead.

Of gutter cleaning there was performed 27,925 squares at a cost for labor of 13.6c and 15.3c total cost including overhead. Of gutter cleaning after flushing there was performed 79,491 squares at a cost for labor of 13.6c or 15.1c with overhead.

The broom gang cleaned 76,626 unit squares at a cost for labor of 24.3c or 29.5c with overhead.

The area served by the department is about 71 sq. miles, in which is about 618 miles of streets. White wings, scrapers and laborers receive $2.25 per day.

The several items are given by districts also (the city is divided into eight districts), including the labor cost per unit for each service in each district for each month of the year. As is generally the case, considerable variation is found in the unit costs in different sections of the city. Perhaps the most extreme variation in street

sweeping costs, for instance, was in January, when the unit costs for the eight districts were as follows: 17.8c, 35.5c, 34.1c, 42.8c, 30.5c, 22.3c, 23.1c, and 19.6c.

STREET LIGHTING IN RICHMOND

Municipal Plant Shows Great Saving to City During Five Years' Operation—Advantages and Efficient Life of Incandescent Lamps.

The city of Richmond, Va., has been operating a municipal electric lighting plant for five years. Some of the citizens considered such operation in the light of an experiment, and the city electrician, E. W. Trafford, in his report for the year 1916 states that it has proved to be a profitable experiment for the city and gives figures for substantiating this statement. The total cost of the service, including interest and depreciation, was $92,092 for the year, $80,660 being for the lighting service. (The difference, we believe, was for power supplied to the water department. No commercial lighting or power is furnished by the city.) Of this total, $47,235 was operating expenditure. The total output was 5,643,310 kwh. The average number of street lights in service during the year was 3,768, and the average candle power of the lights was 232.2. The department furnished 1,459,810 kwh. to the water department. The total amount of current sold to other departments at 3c per kwh. was 29,058.

The city has been substituting incandescent lamps for arc lamps, but at the end of 1916 still had in service 788 500-watt enclosed carbon lamps. Mr. Trafford states that the smaller power consumption of the incandescent lamps has enabled the department to consolidate circuits and release large quantities of copper wire for use in new constructions. The high price of copper wire made this feature of the incandescent lamp a very important one. He has kept careful record of the operation of every lamp connected to the city's lines and finds that the service rendered by the incandescent lamps is better than that of either the enclosed arc or flame arc, judging by the standard of failures during lighting hours. During the year each incandescent lamp was out an average of once in 310 nights, each enclosed arc lamp an average of once in 214 nights, and each flame arc an average of once in 73 nights. It appears from this that the flame arc lamp is that which requires the most attention, and the result of using them, and particularly the type of flame arc first purchased, is not considered satisfactory, especially since the war prevented obtaining foreign carbons. This was especially regrettable because these lamps are located in the most important streets of the city.

He also endeavored to learn the length of time during which incandescent lamps furnished satisfactory service. A number of lamps of which he had an accurate record were sent to the U. S. Bureau of Standards for photometric and efficiency tests, and the reports rendered showed that the average candle power had been maintained within recognized limits of good service regardless of the length of time during which the lamps burned, and he concludes that such lamps may be allowed to remain in service until they burn out without incurring any serious loss either in light or efficiency.

He makes a comparison between the cost of lighting the streets of the city when this service was purchased from a private company (which continued until some time in the year 1911) and the cost to the city at the present time under municipal ownership. "Objection has been made to comparison of this rate of the past with the rates of to-day, but, comparing the price for street lights which our sister city of Norfolk paid five years ago, I find it is paying the same price to-day and is asked to pay an identical price for the next ten years, and this is by the same public service corporation which supplies the citizens of Richmond." The arc lights used in 1910 were of 220 c.p. and cost $54.75 per annum. The average cost of the city plant during the last five years has been $37.26 per lamp per annum, while the lights are of larger candle power (232 c.p.). Comparing the cost of the street lighting service in Richmond with what it would cost to operate the same number of lights at the rates being paid in Norfolk, and including in the Richmond cost interest and depreciation on the value of the plant ($642,500), and also 1½ per cent to cover lost taxes, insurance and other minor expenses of a private plant, it is figured that the same service that costs Richmond $71,362 (including overhead, as stated) would cost on the Norfolk basis $120,344. There are other lights used in Richmond for which no rates can be obtained from the Norfolk contract, and if the same percentage of saving were applied to these also, the total saving effected by the Richmond plant would be $58,472, or about 9 per cent of the value of the plant.

MAKING CUTS IN PAVEMENTS.

In cutting out heavy pavements in Market street, San Francisco, for getting at their pipes and wires, the Pacific Gas & Electric Co. found it slow and expensive work cutting through the heavy bituminous top and concrete base with hand tools, and has adopted the use of hammer drills operated by compressed air. In blocking out the work, it cuts a trench around the area that is to be removed, using a chisel-shaped tool having a cutting edge about 3 inches long. In some cases where the concrete under the asphalt is very hard, for starting an opening a self-rotating hammer drill, weighing 38 pounds, with regular ⅞-inch steel, is used to drill holes making an angle of about 45 degrees with the vertical, into which wedges are driven to break out the concrete. Usually after a small hole has been opened in the concrete in this way, the rest can be broken out with square-pointed gads from 9 inches to 2 feet long, used in a 40-pound air jet hammer drill, with a single wide grip, push throttle handle, without automatic rotation of steel. Most of the gads used have a ¼-inch hole bored through them near the shank, which permits attaching to the gad one end of a chain, the other end of which is attached to the head of the hammer, as shown in the illustration.

CUTTING OUT PAVEMENT WITH AIR HAMMER DRILL.

For obtaining compressed air for these tools, the company uses a small electrically-driven compressor on wheels. Both of the hammers referred to were purchased from the Sullivan Machinery Co.

The 40-pound non-rotative hammer is used for driving sheet piling also. The soil is soft sand, and 2 by 4 and 2 by 6 planks are driven very satisfactorily by means of this hand hammer held on the top of the sheet pile.

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DIAGNOSING BEFORE PRESCRIBING.

Cities of the United States have spent between one and one-half and two million dollars during the last 25 or 30 years in conducting investigations on sewage disposal in special experimental stations. This seems like a large sum to have spent in constructing and operating mere temporary plants, and undoubtedly many city officials and tax-payers have felt that, in asking them to make these expenditures, their engineers were making a confession of ignorance—that an engineer, if he professes to be an expert in sewage disposal, should be able to prepare a design for any city from his previous knowledge and not ask the city to pay for his acquiring knowledge necessary to prepare such plans.

In a lecture on the subject which is abstracted in this issue, Mr. Pearse has partially answered this question as follows: "In the planning of engineering projects, it is frequently necessary to meet new conditions under circumstances where previous experience indicates no certain solution. This is particularly true in the field of sanitary engineering, which has grown vigorously since 1888, largely due to the demand for better public health and municipal sanitation." The chief reason why such investigations are necessary before planning the larger and more expensive works for treating sewage is that sewage itself is such a variable material that its characteristics are seldom the same in any two cities. Another and less important difference is in the climatic and other local conditions which vary from city to city. The sewage treated in disposal plants is generally a mixture of domestic sewage and industrial sewage. There is perhaps not so much variation in the former except in its strength, but the nature of industrial sewage depends upon the relative amounts of waste water discharged by each of the various kinds of industries in the city and the nature of the processes carried on in each of these; and it is evident that there are hardly any two cities to be found in the country in which both the kinds of industries and the relative proportions of waste therefrom are identical. For instance, the sewage of Worcester, Mass. has as one of its determining characteristics an abundance of acid in the shape of waste pickling liquors, while certain sewers in Philadelphia carry enormous quantities of greasy matters contributed by wool washing.

In addition, it may be said that improvements and developments in methods of treating sewage have succeeded each other so rapidly during the past 15 or 20 years that none of the later of these, at least, has yet been so thoroughly studied that its operation under any and all conditions can be confidently predicted by anyone, even though he be practically familiar with all of the available information on the subject.

While it is probable that any experienced sewerage engineer can design a plant for any given city which will prove fairly satisfactory, he cannot feel certain without trial that the plant so designed will be the most satisfactory one possible. Where a large sum of money is to be spent, it is quite probable that by trying out two or three of the most promising methods in small plants, a saving may be made in first cost of the complete plant, or in cost of operating it, or in both, which will far outweigh the expenditure made upon such test.

THE PROBLEM OF RURAL ROADS.

There are, according to the United States Office of Public Roads, more than 2,000,000 miles of rural roads in the United States which have never been paved or surfaced in any way, but which consist only of the natural soil, which has been kept in more or less satisfactory condition by the use of scrapers and drags in some cases, but in many others has never even been graded or improved in any way. To put reasonably good paving upon all of this mileage at an average cost of say $10,000 a mile would cost more than twenty billion dollars. It is probable that the United States will spend all of that amount in the war upon which it has just entered—England has already spent more than twice as much—and it might be an open question whether, if we can raise such a sum for war purposes, we cannot raise a similar sum for road construction, which could be considered as an investment of the money from which financial returns might be expected. Possibly the time will come when such expenditure for good roads will be possible, but that time certainly has not yet arrived.

In fact, we question very much whether such expenditure would be wise at the present time. There are undoubtedly many thousands of miles among these two million over which not more than one or two teams a day pass, and it is more than questionable whether, in the majority of such cases, an expenditure of $10,000 a mile in paving would not be almost total waste. Especially when we consider that most of these can be kept in a very fair condition during ten months of the year by a little judicious use of the drag and other simple and inexpensive methods of maintenance.

The existence of such an enormous mileage of dirt roads, however, does seem to point to the necessity for some widespread education in the proper methods of maintaining such roads, and for a greater amount of attention by state road authorities to promoting such education rather than devoting all of their energies and finances to the more interesting task of constructing high-grade road surfaces.

INTAKE AND OUTFLOW VELOCITIES

Effect of Mouthpieces or Flaring Ends on Pipes and Conduits in Reducing Loss of Head—Application to Turbines, Pump Connections, etc.

Bulletin No. 96 of the Engineering Experiment Station of the University of Illinois contains a description of and conclusions from experiments on the effect of attaching mouth pieces to the intake and outflow ends of a short pipe, so far as these affect the head lost at entrance and exit and the velocity of flow through the pipe. The problem investigated might appear to be one of very little practical value, but in certain classes of work having to do with water (including sewage) the solutions of it are by no means unimportant. Concerning this, the investigator (Fred B. Seely, Associate in Theoretical and Applied Mechanics) cites a number of instances where it is of considerable importance to know how to reduce this lost head. For example, the passages through a large valve or through locomotive water columns, the draft tube to a turbine, the connection from a centrifugal pump to a main, sluice ways through dams, slat screens at head gates, culverts and short tunnels, suction and discharge pipes of dredges, and the guide vanes and runner of a turbine. The efficiency of a pump working under low head may be increased by an entrance mouthpiece on the suction pipe because it would allow the pump to receive the water in smoother condition of flow. It is well known that a turbine must receive the water from the guide vanes without shock if, in the subsequent flow through the runner, the energy of the water is to be absorbed efficiently by the turbine. The loss of head through a Venturi meter may be considerably increased if the meter is placed too short a distance downstream from a valve, elbow, or other obstruction or cause of disturbance in the pipe. It is worth mentioning in this connection that the recent advances in turbine design have been due largely to the attention given to the approach channels to the guide vanes and to the design of the draft tube.

The experiments described in this bulletin consisted in attaching conical mouthpieces to the entrance and discharge ends of a pipe 6 ins. in diameter and 22½ ins. long. No experiments were made with mouthpieces with curved elements rather than straight, although it would appear to us that the effect would have been increased by the use of such mouthpieces. The velocities through the pipe during these experiments were made to range from about 0.6 of a foot per second to 5 feet, or those which are most commonly found in flow in sewers, water mains and other forms of conduits.

Without going into any of the details of the experiments, the author's conclusions may be quoted as follows:

"The preceding discussion has shown that the losses accompanying the flow of water depend largely upon the state of its motion, which in turn is influenced by many factors, the effects of which in many cases can be but roughly estimated. While the results of these experiments tend to define the range of such effects for certain conditions of flow, additional experiments would be necessary to establish all the inferences which have been suggested. The following conclusions, however, seem justified:

"(a) As applying to conditions likely to be met in engineering practice, the value for the head lost at the entrance to an inward-projecting pipe (i. e., without entrance mouthpiece and not flush with the wall of the reservoir) is 0.62 of the velocity head in the pipe $(0.62\frac{v^2}{2g})$, instead of $0.93\frac{v^2}{2g}$, as usually assumed. To put it in another form, the coefficient of discharge for a submerged short pipe with an inward-projecting entrance is 0.785, instead of 0.72, as given in nearly all books on hydraulics. Further, the lost head at the entrance to a pipe having a flush or square entrance is 0.56 of the velocity head in the pipe $(0.56\frac{v^2}{2g})$, instead of $0.40\frac{v^2}{2g}$, as usually assumed. In other words, the coefficient of discharge for a submerged short pipe with a flush entrance is 0.80, instead of 0.82, as given by nearly all authorities.

"(b) The loss of head resulting from the flow of water through a submerged short pipe when a conical mouthpiece is attached to the entrance, may be as low as 0.165 of the velocity head in the pipe $(0.165\frac{v^2}{2g})$ if the mouthpiece has a total angle of convergence between 30 and 60 degrees and an area of ratio of end sections between 1 to 2 and 1 to 4 or somewhat greater. In other words, the coefficient of discharge for a submerged short pipe with an entrance mouthpiece as specified above is 0.915.

"(c) The loss of head which occurs when water flows through a submerged short pipe having an entrance mouthpiece varies but little with the angle of the mouthpiece if the total angle of convergence is between 20 and 90 degrees and if the area ratio is between 1 to 2 and 1 to 4 or somewhat more. The loss of head for any mouthpiece within this range would be approximately 0.20 of the velocity head in the pipe $(0.20\frac{v^2}{2g})$. There is, therefore, little advantage to be gained by making an entrance mouthpiece longer than that corresponding to an area ratio of 1 to 2. Thus, an entrance mouthpiece with a total angle of convergance of 90 degrees and the length of which is only 0.2 of the diameter of the pipe gives approximately $0.20\frac{v^2}{2g}$ for the loss of head.

"(d) The amount of velocity head recovered by a conical mouthpiece when attached to the discharge end of a submerged short pipe depends largely upon the angle of divergence of the mouthpiece. This is true for lengths greater than that corresponding to an area ratio of 1 to 2 and for total angles of divergence of 10 degrees or more. The amount of velocity head recovered decreases rather rapidly as the angle of divergence increases from a total angle of 10 to 40 degrees. At or near 40 degrees the amount of velocity head recovered falls rather abruptly to approximately zero.

"(e) A conical discharge mouthpiece having a total angle of divergence of 10° and an area ratio of 1 to 2, when attached to a submerged short pipe, will recover 0.435 of the velocity head in the pipe, which is 58 per cent of the theoretical amount possible of recovery.

"(f) The amount of velocity head recovered by a diverging or discharge mouthpiece when attached to a submerged short pipe is considerably more when a converging or entrance mouthpiece is also attached than it is when the entrance end of the short pipe is simply inward-projecting (no mouthpiece attached). This excess in the velocity head recovered diminishes rather rapidly as the angle of the discharge mouthpiece increases, and it becomes zero for a discharge mouthpiece having a total angle of divergence of approximately 40°. This increase in the velocity head recovered is probably due to the effect of smooth flow in the pipe as the water approaches the discharge mouthpiece. The smooth flow allows the mouthiece to recover more of the velocity head in the pipe than when a more turbulent flow exists; this increase amounts to as much as 33 per cent in the case of the discharge mouthpiece having a total angle of divergence of 10° and an area ratio of 1 to 2.

"While these conclusions are drawn from experiments on the flow of water through a particular short pipe having various entrance and discharge conditions, it is felt that the results of the experiments are applicable in a general way to a large variety of cases in engineering practice where the contraction and expansion of a stream of water occurs. A number of such cases are suggested in the introduction."

The WEEK'S NEWS

Oregon's Road Plans and Difficulties—The Legal Attack on New Jersey's Road Law—Officials Fight Epidemics in Montgomery, Ala.; Ravenna, O.; Chisholm, Minn., and Rochester, Minn.—South Bend's Typhoid Epidemic Cause Not Known—Denver Wins in Water Bond Suit—The Wanaque Plan—Ontario to Cut Street Lighting—New Jersey Gas Companies Fail to Get Lower Standard—City Managers in California Towns—Tacoma's Car Line—Jitney Litigation in Georgia—Status of New York City Zoning.

ROADS AND PAVEMENTS

New Wage Scale for Street Workers.

Columbus, O.—The city council has amended the ordinance fixing the salaries of officers and employes of the department of public service by ordering a new schedule of wages for the men in the division of engineering and construction engaged on street work and in the asphalt plant. The new scale is as follows:

Yard superintendent, $20 per week; foremen, each 50 cents per hour; pavers, each 45 cents per hour; assistant pavers, each .375 per hour; rammers, each .34375 per hour; bricklayers, each .70 per hour, or union scale; pipelayers, each .34375 per hour; tunnelers, each .34375 per hour; wagonmen, each .40 per hour; roller engineer, $21 per week; roller engineer, extra, .4375 per hour; painter foreman, .50 per hour; painters, each .45 per hour, or union scale; iron cleaners, each .375 per hour.

Asphalt Plant.—Superintendent, $170 first year; $185 second year; $200 thereafter; foremen, each .50 per hour; engineer, .40 per hour; mixerman, .30 per hour; drum fireman, .30 per hour; rakers, each .40 per hour; tampers, each .30 per hour; smoothers, each .40 per hour; roller engineer, .40 per hour; inspectors on street or sewer construction or repair, public or private contracts under jurisdiction of the division of engineering, .4375 per hour; masonry inspectors, $100 per month.

Road Plans and Problems in Oregon.

Salem, Ore.—The state highway commission has received official notification that the government has rejected the commission's request for post road co-operation in eliminating the Wolf Creek-Grave Creek grade on the Pacific highway near Grants Pass. Notification was received from B. J. Finch, acting district engineer for the government, at Portland, who announced that the secretary of agriculture has disapproved the project. This project, the estimated cost of which is $77,000 for five miles of road, is considered one of the most important in the state's entire program for road improvement, as it is the connecting link between California and Oregon on the Pacific Highway. The government refused to co-operate, on the basis of dollar for dollar, with the state on the technical grounds that the entire road could not be classified as a post road. The present road has a grade, in some places of 24 per cent. and is almost impassable. It is expected the highway commission will undertake to provide funds from other sources to make the improvement. Meanwhile there are 38 projects now receiving the attention of the state highway commission. These projects are in twenty different counties. They represent $2,263,115.21 and total about 190 miles of work and 10 bridges. This mass of work has been launched since June 5 and is the result of four months of activity. The most work will be done in Columbia, Clatsop, Douglas and Hood River. A survey of the 38 projects discloses the fact that the commission is emphasizing four trunk lines, three of which cross the state. The Columbia River highway, an east and west cross-state road; the Pacific highway, a north and south cross-state road, and The Dalles-California highway, a cross-state road running north and south through Central Oregon are being opened, graded and macadamized. The fourth trunk line is the Tillamook highway. The most important project is the West Side Pacific highway, of bitulithic, from Miltonburgh County line to Newberg, running 15.3 miles through Washington and Yamhill counties and costing $330,488.48.

Objections made by W. J. Lyons, manager of the American Surety Company, to the provision in the surety bond being required by the state highway commission of road contractors, to the effect that such contractors "must pay all just debts, dues and demands incurred in the performance of such work," are not valid, according to an opinion given by attorney general Brown to the highway commission. Mr. Lyons urged that this provision be omitted hereafter on the ground it is not authorized or required by law. The attorney general cites supreme court decisions to show that such a provision in a bond is strictly within the law, but he says the highway commission may modify it if the commission so desires.

Attack on Road Law Fails.

Trenton, N. J.—Application of Jersey City and Passaic as municipalities, and Charles P. Gillen of the Newark board of works as an individual, for a writ to review the Edge legislation providing for a state tax to raise $15,000,000 for construction of the state highway system, has been denied by chief justice Gummere of the Supreme Court sitting in Newark. The effect of this denial is that the only way left to get the Edge act into the courts to test its constitutionality, is by quo warranto, in which proceedings the attorney general would have to be a party. In denying the application for a writ to review, the chief justice found that in the application before him there were not sufficient reasons advanced to send the road tax legislation into the courts in an effort to upset it. Denial of the writ does not pass upon the validity of the legislation. This information was received in the Governor's office with great satisfaction, for if the writ had been allowed a litigation that would have covered at least two years would have ensued, and operation of the state highway laws would have been held up pending the suit. The significant feature of the decision was that nothing was found in the argument advanced by counsel indicating that the act is unconstitutional. Following a conference after the announcement of the decision George L. Record, who appeared for the cities of Passaic and Jersey City, said the application for the writ would be renewed before the entire Supreme Court at the opening of the November term.

The two principal grounds advanced in behalf of the municipalities attacking the act were that so-called second class railroad property would escape taxation and that the act would provide for the taxing of property of the Society for the Establishment of Useful Manufactures in violation of an ancient charter granted to the society and exempting it from local taxation. Chief justice Gummere said it might be admitted that second class railroad property, which consists of all property used for railroad purposes outside of the main stem or 100 foot right of way, would escape taxation under the original act. He called attention, however, to the supplemental act providing that such property should be taxed at the increased average tax rate which would result from adding the road tax to local tax rates and that the increase derived thereby should be turned into the road fund. Disposing of the contention respecting the Society for the Establishment of Useful Manufacturers, the chief justice held that the society could enforce its remedy by application to the court, which could then determine whether it is entitled to exemption from the road tax under its old charter. The court found no grounds to set aside the entire act merely because of the alleged invasion of the charter rights of the society. Chief justice Gummere said: "I am not interested in the trouble of the local and county boards in collecting the tax. The only thing I am interested in is the charge that the act is unconstitutional. I can't see anything in the act

which embraces railroad property. I do not think, however, that this makes the act unconstitutional. There is no attempt on the part of the Legislature to impose the burden directly on railroad property. Mr. Record states that the act does not embrace the property of the S. U. M. I believe that it does. A tax can be levied against this society, but by a charter granted it by the State it is expressly exempted from paying this tax. An assessment may be made against the corporation under this act, and it may pay it if it so wishes, but it can refuse to do so under its charter. I am at a loss to see how the Legislature violated any constitutional provision." In his application, Mr. Record asked merely for a judicial review of the tax act, and not the entire road act. He presented as his chief argument the fact that certain properties had been exempted from the assessment, citing railroad property and bank stock. He put this matter right up to the court to decide as a question of fact. On the decision of the court, declared Mr. Record, rested his argument, for he would contest the validity of the act on which ever way the court decided. Mr. Record also declared that the machinery for taxation in the act had not been properly set up. He questioned the right of the county board to order the collection of taxes in this. Governor Edge sent the best legal talent at his command to oppose the move. Appearing for the State were attorney-general John H. Wescott and assistant attorney-general Herbert Boggs. Conferring with State lawyers were senator Thomas F. McCran, of Paterson, who was a leader in drawing up the act, and county tax commissioner Congleton, a lawyer, of Essex County. While it is possible that conditions then existing might necessitate some change in the present program, no intimation of this kind has been given by the state highway commission whose engineers and other employees are working under pressure with the understanding that the work of construction will begin just as soon as the weather will permit in the spring. As outlined at the office of the highway commission here, the present plan is to carry on the construction work just as rapidly as funds will permit. The department has been advised by the state controller's office that the first proceeds from the tax levied under the road law of last winter will be available on January 20. Unless, therefore, there is some hitch in the plans suitable weather will alone be awaited before work begins.

Dismiss Bone Retaining Wall Patent Case.

Indianapolis, Ind.—The United States Circuit Court of Appeals has upheld the decision handed down last year by the lower court which dismissed suit for an injunction to stop infringement of the Bone patent for reinforced concrete retaining walls asked by the inventor against Marion County. Frank A. Bone, of Cincinnati, the inventor, claimed that a cantilever reinforced concrete wall at Indianapolis was an infringement on his patent. In the decision of the Court of Appeals, it is held that the type of wall in question was invented before its discovery and development by Bone, as proved by many publications, mostly European. The opinion of the lower court is also approved that the Akron case would have been decided against Bone had the same evidence as that presented in the Marion case been used then.

SEWERAGE AND SANITATION

City, State and Federal Officials Fight Epidemic.

Montgomery, Ala.—That the diptheria situation in Elmore county is well in hand and need cause the public no apprehension was announced as the result of tests made by the state laboratory. Cultures were taken from practically every white school child in Wetumpka and out of 340 cultures examined only 17 were positive while the remainder were negative. In every instance where a positive diagnosis was made, the child was isolated until two negative tests were shown. A sub-station of the laboratory will be established in Wetumpka under the direction of Dr. C. C. Lake, of the United States public health service, assisted by Dr. Vernon Robbins, field director of sanitation of the state board of health. Dr. H. G. Perry, of the state health department, announced that the danger was past and that the disease was under full control. It is said that one case occurred at Speigners, October 17, and that from then on cases continued to appear, one other being at Speigners, one at Weoka and the fourth out on the Mount Meigs road. These cases were promptly reported to the state health department by the Elmore county health officer, Dr. Justice, who had already taken steps to prevent a spread of the disease. He is given full credit by the other officials, for prompt and energetic action. According to the public health officials the spread was due to carriers, to mild unrecognized cases, and cases of nasal diphtheria; and when the school at Speigners was examined thirty-four out of the forty first examinations proved to be positive carriers. The school at Wetumpka was examined and among those examined the teacher of one of the grades was found to be a positive carrier. Out of the 125 taken at Speigners, eighty or ninety cultures examined by state bacteriologist Dr. P. P. Salter, at the state laboratory, all proved to be positive. The state health department stationed guards to prevent a spread of the disease into Montgomery county, and each and every person coming from the danger zone was questioned closely and investigation made to determine whether he or she was a menace to the health of the citizens and soldiers on this side of the river. Useless travel from the other side was prevented as far as possible. Houses in the zone where there were cases or carriers were quarantined. Military authorities at Camp Sheridan placed soldier guards at the bridge and ferry across the river so that no man in uniform passed into Elmore county.

City and State Health Officials Disagree.

South Bend, Ind.—The health department officials of the city and the state are still wrangling over the cause of the typhoid fever epidemic which recently occurred in this city. A heated interchange of letters, charges and recriminations marks the controversy. Dr. J. N. Hurty, state health commissioner, following the report of his investigators, attributes the greater part of the epidemic to the general insanitary conditions in the city, while Dr. Charles Bosenbury, secretary of the city health department, blames the water supply. The water situation is still baffling the authorities and the state officials have given up the investigation. In tests conducted at the water pumping stations daily it was found that at times the water tests good and at other times it showed contamination. Chlorination apparatus has been installed. The epidemic of typhoid was first discovered here last April, but there was no evidence that the water was contaminated. H. H. Felder, local pathologist, did not discover the contamination until August 23. Since the water system in South Bend is an inter-communicating system it is possible that contamination did not get into the mains at the testing point. The typhoid epidemic has been in an area supplied from the central station all during the year, but has now spread. Dr. Will Shimer and John Diggs, sent by the state board to South Bend on September 15 last to conduct an investigation into the typhoid epidemic, prevalent in the city, are charged with carelessness, negligence and incompetence by Dr. Bosenbury, in a letter to Dr. Hurty at Indianapolis. The letter says in part:

Within a few days a number of drafted men were to be sent from the city to the camp at Louisville. Therefore, we felt it necessary to notify surgeon-general Gorgas that typhoid was epidemic in the city, and I received a telegram advising that surgeon J. O. Cobb would come to South Bend for a conference with the board of health. Mr. Diggs later expressed his opinion that it was not pleasing to have federal aid called in before state authorities had had a chance to make their investigations. It was explained to both Mr. Diggs and Dr. Shimer that we had not asked for federal aid; that passenger trains going through South Bend used South Bend water, and that the United States public health service had jurisdiction.

Our duty in the matter made it imperative that we give the representatives of the state board of health every fact and every clue possible. As a result of our reports Dr. Shimer announced his conviction that this was not a water-borne epidemic. He rather jumped to the conclusion that it was milk-borne.

Dr. Shimer, in company with dairy inspector V. C. Cripe,

visited a number of patients in their homes. So far as I know every possible opportunity was given Dr. Shimer to make his investigation complete, searching and thorough.

We invited Mr. Diggs and Dr. Shimer to attend a meeting of the St. Joseph County Medical society. Dr. Shimer gave his report as did Mr. Diggs. Mr. Diggs seemed willing as a result of his investigation, which, by way, did not include a single analysis of the city water, to absolutely absolve the city water supply from any responsibility as a possible cause of the epidemic. I asked him at the time if he would be willing to make a written statement to that effect and sign it. This he declined to do. Mr. Diggs, so far as he was concerned, had eliminated the water as a possible source of infection. Dr. Shimer would not characterize the epidemic as milk-borne, conclusive evidence that it was milk-borne was lacking. They, therefore, fell back upon glittering generalities, outhouses, careless physicians, general insanitary conditions, etc., had operated to bring on this typhoid outbreak. The opinion has been expressed at their offices in Indianapolis as in the field at South Bend.

There has been considerable disgust and criticism expressed by citizens of this community with the report made by the representatives of the state board of health. It is only fair to you and to them to inform you that it is felt that the superficial manner in which Mr. Diggs and Dr. Shimer attacked the typhoid problem in South Bend is totally unworthy of the state board of health and an insult to the citizens of South Bend, the local medical profession, and, especially to the pathologist of the South Bend Medical laboratory.

We very much regret the necessity for sending you such a letter. In our emergency we asked for assistance. We felt we had a water-borne epidemic. We, who have lived in South Bend for a long time, have had unlimited confidence in the city water supply, and yet, when the local laboratory reported the presence of pollution and b. coli there was nothing for us to do, both the health department and the water department, but to notify the people and warn them to boil the water until the matter could be completely investigated. The sudden rise in the number of typhoid patients coming as it did on schedule time with reference to the reported pollution of the city water supply made us believe then, as we have every reason to believe now, that the city water was chiefly responsible for this typhoid epidemic. The presence of b. coli has been confirmed by Dr. Akin in samples taken by him during his stay in South Bend.

Classing South Bend as the dirtiest city in the state and scoring many of the physicians there for "thinking of the money they were to get rather than medical services they could render," Dr. Hurty, state health commissioner, made a strong statement about the letter of Dr. Bosenbury:

Dr. Bosenbury certainly was peeved because the state health department investigators did not report the cause of the typhoid epidemic just what Dr. Bosenbury thought it was. My men carefully investigated the water supply at South Bend, and they reported that in most analyses the water was not contaminated and only in a few instances did they find any suspicious germination.

It is the insanitary conditions in the city that caused the widespread typhoid epidemic, my investigators reported. Dr. Shimer visited 54 homes in South Bend, and in not one instance had the attending physician given advice as to how to prevent the spread of the infection nor did he recommend anti-typhoid vaccination. Dr. Shimer reported that he found typhoid germs in most of the homes he visited. The back yards were filthy. No effort had been made to ascertain whether the milk supply could have helped in spreading the fever.

Dr. Shimer stated that when he attended a gathering of physicians to discuss the epidemic and ways of abating it, the physicians quarreled and wrangled as to how much should be charged for administering the anti-typhoid vaccination. The physicians finally compromised on a flat $5 a head fee, but they never discussed any phase of abating or preventing further spread of the epidemic.

H. E. Barnard, head of the state laboratory, has made countless analyses of the South Bend water supply, and says the water supply was not responsible for the greater part of the epidemic. John Diggs, an investigator mentioned by Dr. Bosenbury, who is a careful and competent sanitation engineer, said the water supply was obtained from deep driven wells and was of good quality.

Dr. Cobb, of the United States public health department, visited South Bend recently and stated to me: "I think that it is possible that the water supply was a part cause for the epidemic, but the open outhouses and bad sanitary conditions caused the epidemic." Dr. Fox, of the United States public health department, conducted a survey of South Bend a year ago and reported the same conditions as Dr. Cobb.

Dr. Bosenbury's letter and his charges are all buncomb.

Contractor Wins Damages in Sewer Case.

Milwaukee, Wis.— Joseph Hanreddy, Chicago contractor, who sued the city of Milwaukee for alleged damages totaling about $425,000, has been awarded $115,000 in the United States district court. Assistant city attorney Walter Mattison gave notice that the city would appeal the case from the verdict of the jury, claiming that the amount allowed was excessive. The suit went to the jury on three counts. The Hanreddy contract with the city was entered into on April 29, 1913. The first step toward the erection of the new intake tunnel was taken by alderman E. A. Wittig in 1912, when he introduced a resolution in the common council for the construction of the Linwood avenue intake tunnel. Alderman Wittig wanted a tunnel nine feet in diameter, but the council, upon the recommendation of the water works department, directed that a twelve foot tunnel be built. Work was started within a month from the award of the contract on the shore shaft. Shortly after the contract was let, the city engineer ordered that the shore shaft be built of reinforced concrete, instead of brick as called for in the specifications and the city paid for the extra work entailed. A controversy arose on the question of reinforcing the tunnel, Hanreddy claiming that it was not required under the plans and specifications. He was ordered to put in the reinforcement by the city engineer for which he put in an extra charge of approximately $54,000. After the tunnel had been driven a few hundred feet, the city engineer's office submitted a report recommending that the plans for building the tunnel be changed by abandoning the proposed lake crib, 4,000 feet out in the lake, and extending the tunnel a considerable length. Objections were made by city attorney Williams and his staff to paying the money asked by Mr. Hanreddy, and litigation followed. Mr. Hanreddy claimed, among other things, $28,915 for personal services; $54,758.75 for pumping, labor, etc.; $40,345.82 anticipated profits on the lake shaft; $950, anticipated profits on the shore shaft; $2,100 extra premiums on bonds; $32,785 for extra work for reinforcement, and $3,674.54 for extra crib outlay.

Epidemic Closes Public Buildings.

Ravenna, O.—On discovering that the number of cases of smallpox in town had reached thirty, the board of health banned all public meetings, including schools, Sunday schools, church services, picture shows and political mass meetings. The disease is mostly in light form and the board of health reports that it has the situation well in hand.

State Aids in Typhoid Epidemic.

Chisholm, Minn.—With fourteen cases of typhoid fever reported here in forty-eight hours, the state is investigating to ascertain the cause of the spread of the disease. Dr. L. J. Burns, inspector of the state board of health, has been sent here. The local health board is unable to give a reason for the appearance of the disease. Water is obtained by Chisholm from one of the mines, which always has been considered free from contamination.

Diphtheria Epidemic in Insane Hospital.

Rochester, Minn.—Facts of an epidemic of diphtheria at the Rochester State Hospital for the Insane in which positive cultures were otbained from 261 patients and three nurses, of whom about twenty-five are still suffering with the disease, have been made public after nearly three months of secrecy was maintained by the state board of control and the state board of health. The existence of the epidemic was admitted by the officials only when a move was made to secure a "calamity" appropriation of state funds with which to rebuild the dairy barn at the hospital and to complete a new pavilion, which is desired as an isolation hospital. C. J. Swendson of the board of control said no announcement was made of the epidemic that relatives of patients might be spared anxiety. The epidemic began about July 15 and 250 patients and attendants were sick at one time. The condition was made more difficult to handle, it was said, because of the overcrowded condition of the hospital, which forced many patients to sleep on mattresses on the floor in the halls. State health officials said that on the completion of the new pavilion the active cases may be isolated and the epidemic will be ended quickly.

Fight River Pollution by Munitions Plants.

Bay City, Mich.—Papers have been served on the representatives in Michigan of the Du Pont Powder Company, restraining them from dumping creosote and other refuse from their mill at Grayling into the Au Sable river. A temporary injunction, asked by the state has been granted by Judge Howard Wiest, of the Ingham circuit. The judge did not issue the usual order to show cause why the injunction should not issue, but made the mandate at once on the showing made by the state. State

officials are worried. Three departments, the attorney general's, the game commissioner's and the state board of health are working to stop the pollution of the river. Chemical refuse from the mills, as dumped into the Au Sable, was brought to Lansing and used as a basis for experiments by the state chemist connected with the state board of health. This morning these chemicals undiluted killed goldfish in six minutes; diluted one-half it killed goldfish in 18 minutes, and diluted two-thirds, the fish managed to survive almost an hour. On one night game wardens with acetylene lamps searched the Au Sable for ten miles below Grayling and could not find a single trout. The Au Sable has been for years Michigan's greatest trout stream, and as such is known from one end of the country to the other. The killing of its trout is looked upon by the state officials as nothing short of a calamity. The state expects the Du Pont people to make a motion to dismiss the injunction on the ground that the plant is working on war munitions. According to the Du Pont chemists, there is no way by which their work can be carried on successfully without the dropping of this refuse which is so fatal to fish life.

WATER SUPPLY

City Again Wins in $8,000,000 Bond Suit.

Denver, Colo.—The United States supreme court has sustained the Circuit Court of Appeals decision in favor of the city in the suit of the Denver Union Water company attacking the validity of the $8,000,000 bond issue of the city for a municipal water plant. The case decided is known as the Wheeler-Lusk suit and it finally ends the controversy over the bonds, but it has no connection with the water rate suit argued a few weeks ago before the United States supreme court. The case now definitely disposed of by the highest court has been in the courts for nearly five years. After the citizens of Denver voted $8,000,000 bonds for the city to construct a municipal water plant, the validity of the bonds was attacked by the Denver Union Water company in the names of Frank T. Lusk and Mrs. Clara A. Wheeler, stockholders in the company. Judge Lewis first refused to hear the case, alleging that he was without jurisdiction. The water company, through Hughes & Dorsey, its attorneys, appealed to the United States supreme court, and it was held that Judge Lewis did have jurisdiction. Judge Lewis then tried the case and decided in favor of the city. The water company then appealed to the Circuit Court of Appeals and the decision of Judge Lewis was sustained. Following this action the water company's attorneys applied to the United States supreme court for a writ of review by supersedeas. This, it is explained, places a discretionary power in the hands of the supreme court; in other words, the court could grant or refuse the writ. The court refused the writ. This refusal, therefore, sustained the Circuit Court of Appeals and makes its findings final. The $8,000,000 bonds were voted for the construction of a municipal plant and cannot be used to purchase the present plant, it is explained by the lawyers. The action of the supreme court makes valid these bonds so that if the city decided to construct a municipal plant they would not be questioned.

Paterson Joins Newark in Wanaque Plan.

Newark, N. J.—Paterson will join with Newark in making a contract for the development of the Wanaque watershed, paying half of the estimated cost of $8,560,000. This was announced by mayor Radcliffe and city counsel Scott of Paterson to the North Jersey District Water Supply Commission and Newark city officials. No other municipalities offered to join at this time. Although Paterson had united with this city last spring in asking the Water Commission to undertake the development, when it came to the point of making a contract for the work Paterson withdrew, leaving Newark to bear the cost alone until such time as other cities should come into the scheme. There had been no expectation that Paterson would get into the project so soon as the present, but it was explained by that city's representatives that the reason the municipality withdrew in the spring was that it had been advised that the proceedings at that time were not legal in view of the court action brought by the Society for Establishing Useful Manufactures to prevent the execution of a contract. Paterson officials were advised also at that time that they would be in contempt of court if they participated in the contract. That Paterson had taken this view last spring was not known for the reasons stated in the spring for its withdrawal were that it felt it would be better first to acquire the distribution system of the East Jersey Lake Company in its streets before taking steps to get more water, and that the cost would be too much for the present. After Newark made its contract with the water commission it abandoned the contract because of the S. U. M. action. The understanding is that no further steps will be taken toward the making of a new contract until the new city commission takes office in this city. The board of works, if it chose, could proceed right up to the point of making a contract before the Court of Errors and Appeals decides on the appeal of the S. U. M., because the Errors Court agreed that further proceedings should not be stayed prior to that point. The cost, if Newark had gone into the project alone, would have been $8,060,000, but with Paterson also participating an extra $500,000 will be added to the cost, this representing the cost of a pipe line to Paterson. Each city at the outset would take 10,000,000 gallons of water daily, and would divide the cost of the development evenly. It was explained by the Paterson officials that that city would eventually acquire the distribution system of the East Jersey, either by purchase or condemnation, and that this system could be obtained by the time the water should be ready from the Wanaque. On behalf of Glen Ridge, councilman Moran of that municipality has repeated its offer to enter the project eventually, though at present it could not state at what date. The next step in the proceedings is for the water commission to prepare a form of contract and submit this to the two cities. It is unlikely that the contract will be submitted to Newark until the city commission is installed. At the November term of court the appeal of the S. U. M. from the Supreme Court decision on litigation it brought will be heard. At that time also the S. U. M. may request the court to stay the execution of a contract until the court's decision is given.

To Build New Filter Plant.

Newport News, Va.—The extensive physical improvement in cities caused by war activities of the Government is well shown in the example of this city. The Newport News Water, Light & Power Company has contracted with the Roberts' Filter Manufacturing Company, Darby, Pa., to build an eight-million-gallon concrete gravity filter plant, fully equipped with operating tables and hydraulic valves. The work is to be rushed under the approval of the Federal Priority Committee because of the varied interests of the Government in this city and the increased demands upon them. The installation will supersede a four-million-gallon pressure filter plant which has been in successful operation, but which, it is calculated, is not as successful as the gravity system will be. The estimated cost of the work, together with other improvements, will be about $400,000.

STREET LIGHTING AND POWER

To Restrict Street Lighting.

Toronto, Ont.—"The shortage of power from the Niagara district is so intense that the munitions plants are suffering and other factories are not able to secure sufficient power to maintain their outputs." This was the chief reason given by Sir Adam Beck for action taken by the Ontario Hydro-electric Power commission which will result in restriction of the use of Hydro current in the municipalities of the Niagara district. Sir Adam sent to the Niagara district municipalities a communication pointing out that it will be necessary to limit street lighting and sign lighting, as well as power to customers during the peak hours. It is probable, therefore, that some twenty cities and towns on

the Niagara district system, including Toronto, Hamilton, London, Brantford, St. Catharines, Niagara Falls, Stratford, Chatham, St. Thomas, St. Mary's, Windsor, Woodstock, Kitchener, Galt, Hespeler, and other places will be in comparative darkness, so far as street lighting is concerned, between the hours of 5 and 8 in the evening, unless steam reserve plants that may be available in some of the municipalities are used. The action taken was rendered necessary, Sir Adam further explained, because of the situation brought about by the stopping of the supply of power from the Electrical Development Company. "The Government has not yet issued licenses for this year restricting the export of power, in consequence of which there is a serious shortage," he stated.

Lower Gas Standard Refused.

Trenton, N. J.—Consumers of gas in New Jersey have won their fight against the gas companies in this state on the application made to the Board of Public Utility Commissioners for an order allowing a reduction in the standard of the commodity, which would have amounted to greatly increased costs to the public. Constituting one of the most important decisions of its kind, the commission's report holds that "from all the testimony we conclude that the board is not warranted in disturbing the present rule." That the action of the 14 companies generally termed subsidiaries of the Public Service Gas Company, which concern was also a party in the matter, was in reality a request for increased rates, made pretentiously, is inferred by a section of the report, which states that if existing rates are no longer just, a specific and direct application should be made for sufficient rates, and that "the situation is not to be met by substituting for a proper and adequate service, a service which may be inadequate." The matter was brought before the commission in February last under a petition filed on behalf of the Bridgeton Gas Light Company and 14 other gas concerns, asking that an alteration or amendment of rule 9 of the board be made calling for the reduction of the requirement of the monthly average of heating power in gas. While that petition was pending the Public Service Gas Company filed a petition seeking the suspension or reduction of the requirement as to calorific value. The standard of gas required to be supplied to the consumer, which will now be maintained, was fixed by the commission in October, 1911, after a number of hearings, at which were present representatives of gas companies, municipalities, institutions of learning, other state commissions and experts from the National Bureau of Standards. Hearings have been held during which among the most able attorneys of this state battled for both the municipalities opposing the issuance of the order, and the gas companies. George L. Record, who represented the city of Passaic with A. O. Miller, was a conspicuous figure throughout the proceedings against what he at one time termed "the gouging of the public by the domineering and all-powerful special interests." Trenton was represented at the hearings by city counsel Charles E. Bird. In the applications, the reasons advanced by the companies for requesting the order by the commission were: The increased cost of manufacture and distributing of gas; that the consumer can burn more efficiently in ordinary appliances a leaner gas than that of the present value, and that the necessities of war require furnishing additional quantities of benzol and toluol for the manufacture of explosives, which substances can be secured only by washing the gas of the light oils and reducing below the present standard the calorific value. The proceeding being not intentionally a rate case, the commission in its ruling points out that the question of cost is therefore related only in so far as the purpose of establishing a standard is to provide a calorific or heating value that is practicable and economic, it holding to be true that a gas of higher value than is reasonably required for the uses of the consumer, or of higher value than can be efficiently used, should not be demanded. The board declares that the proof on the question of cost is meagre, and not sufficient to show that the cost of producing the gas of the present standard is, under ordinary conditions, excessive, nor that any difficulty is encountered in manufacturing gas of the present standard. In the claim of the companies that the need of toluol in the manufacture of explosives makes it necessary to recover light oils, the report states: "No one can resist such an appeal if supported by proof. In fact, one is led unconsciously to weigh every consideration most heavily in favor of supplying to the government and its allies, every possible aid, and the board unhesitatingly asserts that if the proofs showed that necessary materials could be supplied by granting this application, which otherwise would be denied the federal authorities, we would promptly grant the petition." After such action, however, the board held that the question of whether under the new conditions, the existing rate was just and reasonable would be taken up. Testimony taken by the commission on the subject is pointed to as proof that the contention of the companies could not be verified and that in fact only large gas producers would be likely to install, or be warranted in installing apparatus for the recovery of those materials. It was further held, according to the report, that no benzol or toluol was reported as having been produced in the manufacture of water gas. It was still further shown by experts that benzol is actually added to enrich the gas after the benzol and toluol have been separated. It is suggested in the decision that if the supply of toluol was inadequate to meet the needs of the federal government, and if the need of augmenting the supply demanded the lowering of standards of heating value of gas, direct representation would have been made by the Government, which was not done. "Taken as a whole," says the report, "the proofs fail to show with any degree of certainty that a material addition to the available supply of toluol would follow upon the lowering of the standard." In the matter of the contention that the consumer can burn more efficiently in ordinary appliances a leaner gas than that of the present standard, the commission also finds lack of proof, and says experts do not support the claim that the present standard is higher than is required in adequate service. The conclusion is given that the fixtures are now generally adjusted to the present standard, and nothing shows that under present conditions any trouble has resulted to the appliances making for inefficient service. On the other hand, it is held to be apparent that if the prevailing standard were lowered, confusion and difficulty would be experienced until new adjustments were made.

Company Would Abandon Service and Sell Pipe.

Hope, Ind.—Suit has been filed in the Bartholomew county circuit court at Columbus by the Fuel Gas Company of Indiana, asking that it be permitted to abandon serving the town of Hope, in that county, with natural gas. The action is an appeal from a ruling of the Indiana public service commission denying the request of the utility. It sets up the declaration that for several years the company has been supplying natural gas to Hope, which has a population of about 1,200. This gas comes from the Rush county field, a distance of about eighteen miles. The company's original investment, the complaint says, was $25,000, and from time to time since then it has been necessary to clean out the old wells and drill new ones to keep up the service. "Considering the amount of money invested and considering the fact that the supply of natural gas must soon become entirely exhausted, the dividends to plaintiff's stockholders have been small," the complaint avers. Speaking of war conditions the complaint says that "because of the advance in pipe due to the war in Europe, the pipelines alone, belonging to plaintiff, have now, and for many months have had, a market value of more than $60,000; and that the pipelines extending from said town of Hope to said gas field have a market value of $50,000." It will be necessary, it is alleged, because of the fact that the supply of natural gas is becoming exhausted in the Rush county field, to put in a gas pumping station at an expense of $8,000, and a gas holder at an expense of $22,000. The company prefers to give up its business at Hope and sell such gas as it has to Waldron, St. Paul and Shelbyville. This can be done with about seven miles of pipelines. Just as many people will be served, it is declared, and the company will be able to take up several miles of mains leading to Hope and sell them at a great profit, due to the war prices. Last summer

the gas company surrendered its franchise at Hope and elected to operate under an indeterminate permit from the public service commission. Later the company filed a petition asking the commission to permit it to discontinue serving Hope with natural gas. Residents of Hope protested, and the commission decided in favor of the gas users. The town of Hope then filed an action in the circuit court here, asking for a restraining order against the Fuel Gas Company, which it was alleged, in violation of the commission's order, was taking up its mains and getting ready to leave Hope without any natural gas supply whatever. The public service commission found, when it considered the evidence in the Hope situation, that, although the claim was made that the company had property valued at $25,000, the property had been sold to A. B. Ayers and some associates, of Fortville, Ind., in May, 1917, for $17,000. Using this sum as a basis for calculations, the commission learned that the company had been earning something more than 21 per cent on its valuation. In its ruling, the state board pointed out that, owing to the unprecedented demand for gas pipes of all sizes and the inability of the users to procure it, second-hand pipe was worth, in many instances, more than new pipe could have been bought for a short time ago. This condition, the commission added, created a desire to sell, as in the present case, where property bought for $17,000 could be disposed of for $45,000. So long as the profits of the business yielded more than 21 per cent on the investment of the present owners and more than 8 per cent on the price offered for the property, the commission believed there was no reason why the public service should be abandoned over the protest of the people of Hope. The commission said: "This commission will not willingly permit the abandonment of a public service solely to enable the investors to reap a fabulous return on their investment."

FIRE AND POLICE

City in Darkness When Plant Burns.

Traverse City, Mich.—Fire which destroyed the $50,000 power plant here, owned by the Boardman River Power Company, practically left this city without any electrical power or lighting facilities and many plants may be forced to close down. One employee was so badly burned he may die. An explosion caused, it is said, by a hot box set the building afire just before daylight.

Explosion and Fire in Lumber Plant.

St. Louis, Mo.—Fire, following an explosion which shook houses for blocks around, caused heavy damage to the plant of the Hill-Behan Lumber Company and the Wabash Railroad tracks, St. Louis County. The loss is variously estimated at from $100,000 to $150,000. The explosion occurred in the sawmill, partly wrecking the building, and within a few minutes it was enveloped in flames. The blaze quickly spread to lumber piles adjoining the building. The fire had gained such headway upon the arrival of the Universal City department that four St. Louis companies were pressed into service. According to marshal Willmann he heard the explosion fully three minutes before the fire started. He was several blocks away. Firemen were handicapped in fighting the blaze on account of the low water pressure. The water had to run through 1,500 feet of hose and only three streams were used.

Bring Fire Apparatus on Tugs.

New York, N. Y.—Three buildings of the House of Refuge on Randall's Island, a state reformatory for boys, were destroyed by fire, causing a loss of $100,000. A fire department of about one hundred boys in the institution tried to fight the fire with a small engine and strings of small hose, but it spread so rapidly that E. C. Barber, superintendent of the institution, had to send a call for city apparatus. Two fireboats were sent to the island and fire chief Kenlon sent out two alarms for apparatus, and finally transported five engine companies to the island on tugs. The fire had burned out an end of the brick school building when the engine companies arrived from Harlem, but the lines of hose were strung so quickly that the flames were checked before they could reach one of the dormitories only a few feet from the end of the school building. The laundry and the dry room were completely destroyed, however, and firemen said the damage to the school building was so great a new building would have to be erected. About $20,000 worth of new winter clothing ready for issuance to the inmates was destroyed in the laundry.

GOVERNMENT AND FINANCE

New City Manager Appointed.

Hanford, Cal.—Jay Hinman of Bakersfield has been named city manager by the city trustees. His salary will be $150 a month. Trustee Pepper was to have received the job, but would not vote for giving himself a salary. A deadlock resulted for several months.

City Wants Manager.

Santa Barbara, Cal.—This city is to have a city manager when its new charter goes into effect the beginning of next year. The council-elect has selected a committee to receive applications from aspirants to the position until December 1. The committee asks that the first letter of candidates should state qualifications and the salary expected and should include adequate references. The salary is not fixed in the charter, but will be "dependent on the man." Santa Barbara has a population of approximately 20,000.

English City Gets Big Income from Enterprises.

Bradford, England.—The city of Bradford during the year ended March 31, 1917, derived an income from its trading undertakings amounting to $5,529,828. The aggregate amount of working expenses was $3,611,279, leaving a gross or trading profit of $1,918,549, which represented 5.10 per cent upon the total capital expenditure on these undertakings, namely $37,643,365. Of the debt incurred, $12,468,153 has been repaid or is available in the sinking funds, leaving a net debt of $25,175,212. The amounts applicable to the respective undertakings are as follows:

Undertakings	Expenditure during the year	Total capital expenditures	Loans repaid and sinking funds in hand	Net debt
Waterworks	$325,204	$19,712,712	$4,328,557	$15,384,155
Nidd Valley Lt. Ry.	341	305,071	29,666	275,405
Tramways	394	5,076,416	2,271,176	2,805,240
Gas works	95,481	6,101,895	2,651,688	3,450,207
Electricity works	275,351	4,822,045	2,285,338	2,536,707
Markets	.....	1,346,896	830,998	515,898
Conditioning house	54	278,330	70,730	207,600
Total	$696,825	$37,643,365	$12,468,153	$25,175,212

The Bradford city tramways for the year ended March 31, 1915, made a net profit of $149,898 as compared with $144,881 in the previous year. Traffic expenses, including wages of employees, war bonuses, and allowances to dependents of men serving in the army, showed an increase, but expenditures on repairs and maintenance both of rolling stock and lines have necessarily been deferred. The Bradford sewage works for the first time in its history met all its expenses without any assistance from the rates, having received $389,320 from the sale of grease extracted from the city's sewage. The city's rates for the current year have been reduced by 6d. (12 cents) in the pound sterling ($4.86), the figure now being 9s. 3d. (2.25); but when this reduction was announced the rate payers were reminded that a considerable proportion of the saving effected by the various municipal departments was but temporary.

TRAFFIC AND TRANSPORTATION

Company to Operate Municipal Car Line.

Tacoma, Wash.—The city is arranging with the Tacoma Railway & Power Company for the operation of the Municipal Car line on the tideflats by the company. The provision of the contract are summarized as follows: The company is to operate the city's car line for two years at actual cost; the company furnishes car barns, shops and storage yards, but is not responsible for any injury or damage to the cars; the company will operate the lines according to schedules arranged by the city, with equip-

ment and facilities furnished by the city and under the direction of the city superintendent; the company will turn over to the city treasurer money received during the month's operation; the bill of cost shall be paid by the city to the company monthly to include power rate at .75 cent per kilowatt, and the actual cost of repairing the entire system. Further clauses provide that the city shall pay for moving the cars, their repair and inspection, and not hold the company liable in damages and claims. The bill of cost will include charges for general expenses agreed to by certain officials of the city and company and passed on by the public service commission. The city will receive 2 cents and the company 3 cents on all transfers in the city limits, and the company 3 cents and the city 2 cents for all transfers outside of the city limits. In case the city desires to operate the St. Paul avenue line they will pay a sum equaling 12 per cent per annum to cover certain depreciations. The contract will be considered null and void if the city acquires all or a majority of the company's lines in the next two years. A proviso calls for the public service commission to act as a board of arbitration between the city and company in case of trouble.

Grade Crossing Elimination Law Constitutional.

Trenton, N. J.—New Jersey's railroad grade crossing elimination law has been declared constitutional in an opinion filed in the Court of Errors. The act, passed during the administration of Governor Fielder, was attacked by the Erie Railroad Company. The act was reviewed on an order issued by the Public Utility Commission, directing the Erie Railroad Company to eliminate within eight years a number of grade crossings in Paterson. The cost of this work is estimated at about $3,000,000. This order was taken into the Supreme Court by the Erie and there affirmed. The present Court of Errors decision affirms the decision of the Supreme Court, and the effect is that the Erie will now have to proceed to eliminate the Paterson grade crossings. The decision is of sweeping importance in this state, as it leaves with the utility commission the power to order abolition of grade crossings after they have been proved to be dangerous.

Jitneys in Georgia Lose Case.

Atlanta, Ga.—The jitneys in this state were defeated for the third time when the supreme court held that the Atlanta ordinance regulating jitneys and requiring them to have bonds is valid. The ordinance was passed in April, 1915. The jitneys appealed to the court against the Railroad Commission taking jurisdiction, but the court held that since the commission had enacted no regulations there was nothing to decide. It is expected that this may prove to be the final defeat of the jitney bus in the state. The jitney men have expressed their determination to carry the fight against the ordinance to the Supreme Court of the United States. Fifty members of the Atlanta Jitney Bus Association have pledged their support to a scheme by which 150 jitneys could supply transportation for soldiers at the Camp Gordon cantonment. The traffic committee of the association has proposed the organization of the People's Transportation Company to operate trains of motor trucks from the camp to a terminus in the city, each truck to carry eighteen people and to draw four trailers carrying twelve people each.

MISCELLANEOUS

Zone Law Case Appealed.

New York, N. Y.—The validity of the so-called building zone resolution of the New York City Board of Estimate and Apportionment, which divided the city into three classes of districts, has been attacked in the Court of Appeals at Albany in the case of Estelle P. Anderson against Steinway & Sons. The action was brought for a specific performance of a contract for the sale of property. The appellant filed an answer in the lower court, admitting that the plaintiff was willing to fulfill the contract on her part, that she tendered a deed of the premises on August 1, 1916, and that the defendant refused to pay the balance of the purchase money. Steinway & Sons alleged that the Board of Estimate and Apportionment of the City of New York, subsequent to the signing of the contract and under the power conferred by the laws of 1916, passed a building zone resolution, and that the block where the plaintiff's property was located was a residence district. Steinway & Sons insisted that the resolution placed an incumbrance on the property and that the plaintiff therefore was unable to convey title to the property and that the plaintiff's title was unmarketable. Meanwhile, in a letter to the Board of Estimate, the City Club of New York, through its president, Nelson S. Spencer, has filed a vigorous protest against a proposed blanket extension of building permits, which if granted now would be in violation of the zoning law. In the summer of 1916, at the time of the enactment of the zoning law, a number of these permits were granted. Persons holding them were given a year in which to construct the new buildings, up to and including the second tier of beams. Certain interests are now actively at work endeavoring to have this concession extended another year. The Board of Estimate's Committee on City Plan has suggested that in cases where actual construction or fabrication has been begun the Board of Appeals may extend the permit for not to exceed six months. This latter provision, the City Club believes, will safeguard the public and at the same time afford adequate relief to persons who have in good faith acted on the permits granted. The proposed amendments are: "So as to extend for one year the time allowed for the completion of the ground story framework of buildings, permits for the erection of which were issued under the resolution," and "so as to authorize the Board of Appeals to extend such time for six months in cases coming within condition outlined in the report of the Committee on City Plan." The letter says: "The City Club is opposed to the first of these proposed amendments of the zoning law, which would provide blanket extension of the permits under consideration for one year. We are in favor of the second amendment which would permit the consideration by the Board of Appeals of those cases which merit equitable relief. Last June we filed with the Committee on City Plan of your board a memorandum indicating our position. In July, 1916, when your board adopted the present zoning resolution, it went out of its way to be considerate to persons who then contemplated the erection of buildings. It gave to all who had filed applications up to July 25 and who received permits between that date and October 25 one year in which to complete their proposed buildings to and including the second tier of beams. In so doing your board set up a measure by which the intention and the good faith of prospective builders could be tested."

Show City Plans at Fair.

Sherman, Tex.—Following the employment of George E. Kessler, the St. Louis city planner, by the city commission to replan the city, the management of the Red River Valley Fair arranged for a city plan exhibit which was shown under the personal supervision of Mr. Kessler during the recent fair.

To Test New Park Law.

Indianapolis, Ind.—Suit to test the constitutionality of the new park, boulevard and playground law, passed during the last session of the legislature, has been filed in superior court. The new law provides that cities of the first class may, by popular vote, create a park and boulevard corporation separate and apart from the municipality, the corporation to have under its care the construction and laying out of parks, boulevards and playgrounds, the funds to be derived from a special assessment levied for the purpose of constructing and keeping in repair this part of the city. The law was advocated by Republican members of the house of representatives in the last session as the proper way to divorce the park control system from politics and to conserve the resources of the city in the construction of parks and playgrounds. Under the present system it is said certain parts of the city can not obtain the park boulevard and playground advantages that other sections enjoy because of the low value of property in these neighborhoods. The mayor and the members of the park board are made defendants in the test suit, as they are charged with the administration of the law.

NEWS OF THE SOCIETIES

Calendar of Meetings.

Nov. 13.—NATIONAL TAX ASSOCIATION. Annual conference, Atlanta, Ga. Secretary, Fred R. Fairchild, Yale University, New Haven, Conn.

Nov. 14-16.—FIRE MARSHALS ASSOCIATION OF NORTH AMERICA. Annual convention, New Orleans, La. Secretary, W. M. Campbell, New Orleans, La.

Nov. 15-16.—ASSOCIATION OF URBAN UNIVERSITIES. Annual meeting, Pittsburgh, Pa. Secretary, Frederick B. Robinson, City College, New York, N. Y.

Nov. 19-24.—CITY MANAGERS' ASSOCIATION. Annual meeting, Detroit, Mich. Secretary, W. L. Miller, City Manager, St. Augustine, Fla.

Nov. 20-21.—ASSOCIATION OF GOVERNMENTAL RESEARCH AGENCIES. Third annnal meeting, Detroit, Mich. Secretary, C. O. Dustin, Statistical Bureau, Red Cross War Council, Washington, D. C.

Nov. 20-23.—PLAYGROUND AND RECREATION ASSOCIATION OF AMERICA. Recreation Congress. Secretary, H. S. Braucher, 1 Madison Ave., New York, N. Y.

Nov. 21-24.—NATIONAL MUNICIPAL LEAGUE. Twenty-third annual meeting, Hotel Statler, Detroit, Mich. Secretary, Clinton Rogers Woodruff, 703 North American Bldg., Philadelphia, Pa.

Jan. 3, 4.—NEW JERSEY STATE LEAGUE OF MUNICIPALITIES. Annual convention, Trenton, N. J. Secretary, Clinton A. Swartz, Trenton, N. J.

Jan. 15-17.—VIRGINIA GOOD ROADS ASSOCIATION. Seventh annual convention, Richmond, Va. Secretary, C. B. Scott, Richmond, Va.

Feb. 6-13.—FIRST CHICAGO CEMENT MACHINERY AND BUILDING SHOW. Supersedes annual Chicago Cement Show. Held at the Coliseum, under direction of the National Exhibition Co.

March 17-24.—PAN-AMERICAN CONGRESS ON CHILD WELFARE, Montevideo, Uruguay. Secretary, Edward N. Clopper, 105 East 22d Street, New York, N. Y.

National Tax Association

Announcement is made of the eleventh annual conference on taxation held under the auspices of the National Tax Association, an organization of taxing officials and leading specialists and business and professional men in the United States and Canada. The conference is to be held at Atlanta, November 13-16, and is composed of delegates appointed by the governors of states, state associations of accountants and by university presidents. Previous conferences have been attended by delegates from a large majority of the states and it is likely that with the great general attention now devoted to the subject, this conference will be the largest ever held.

The practice of the association is to subject the various formal addresses to analysis and discussion by means of "round table" sessions, at which the proposals are debated and criticised with the result that a general consensus is reached as to disputed points. The entire proceedings are published in book form and thus made available for general reference. These volumes are widely distributed, being found in a large number of public libraries throughout this country, in Canada and abroad.

An important place will be assigned at this conference to Federal tax problems, which it may be assumed will provoke interesting discussion of the new taxes now being devised in Washington. It is expected that representatives of the Federal Government will be in attendance. Professor E. R. A. Seligman will make an address on some phase of war taxation and a report will be made by a committee on Federal taxation. A session will be devoted to addresses on corporation taxation, including a paper on the taxation of business by one of the leading experts.

The initial move will be made in a comprehensive plan to suggest and elaborate a so-called "model system" of taxation which it is hoped that the various states may be led to draw upon from time to time, thus carrying out a much needed co-operation toward uniformity in taxation and an abandonment of conflict due to overlapping jurisdiction. Reports will be made of interesting experiments which have been taking place in Canada. A comprehensive discussion of the problems of securing efficiency and care in the making of local assessments will be considered by a group of the most experienced tax administrators in the country. The present decided trend toward income taxation by the states will be thoroughly discussed by the leading experts in that particular field.

Along with its study of methods of taxation the association has always emphasized the need of careful attention to expenditures, economy and efficiency in governmental costs and a committee is charged with the development of this feature.

The wide scope of the discussions is indicated by the fact that the program will carry addresses by persons in close touch with the situation in upward of twenty states in all parts of the country. The governors of the various states, university presidents and the premiers of the Canadian provinces, in their replies to the invitation extended by Governor Dorsey of Georgia, have expressed a deep interest in the conference and have already named official delegates in many cases. Several governors have announced their intention to attend. The public is cordially invited to attend the conference and participate in the discussions.

Samuel T. Howe, chairman of the Kansas Tax Commission, is president of the association, Professor Charles J. Bullock of Harvard is vice president and Professor Fred R. Fairchild of Yale University, secretary. The executive committee includes leading taxing officials throughout the country.

Further details and copies of the program may be obtained from A. E. Holcomb, treasurer of the association, 195 Broadway, New York.

League of Minnesota Municipalities.

The League of Minnesota Municipalities closed its fifth and best annual convention, at St. Cloud, with a wonderful patriotic address by Mayor W. D. L. Hardie of Lethbridge, Canada. Mayor Hardie's subject was, "Which Shall it Be—'Kultur' or Civilization"? Mayor Hardie carried his audience with him by his recital of war conditions as brought home to his people through three years of conflict, and urged the municipalities of Minnesota to prepare for the things they must do as the war comes home to this country.

Wednesday evening President M. L. Burton had spoken on "Changes Ahead." He emphasized that the significance of America is not so much what it now is as what it is going to be, and when he bespoke the unqualified loyalty of every citizen the applause testified that he was expressing the sentiment of this entire audience.

State Auditor Perus spoke on the justice of the war and contrasted the German autocracy to the democracy of America.

A. D. Wilson, Federal Food Administrator, explained the work of the food administration and the effect of his presentation was a resolution by the League pledging cooperation and backing of the League for food conservation. Other resolutions voiced the patriotism of the League, as emphatically as did the applause the delegates gave every patriotic expression.

The League voted to invest $200 of its funds in Liberty Bonds of the Second Liberty Loan, and as much in subsequent issues as the condition of the treasury would permit.

It was voted to send the executive secretary of the League, Mr. E. L. Bennett of the Municipal Reference Bureau of the University of Minnesota, to attend the convention of the National Municipal League in Detroit, Michigan, in November. The following were elected to office—Mayor Michael Boylan, Virginia, President; Vice President, George G. Magnuson, Commissioner of Finance and Accounts, St. Cloud; Secretary-treasurer, Richard R. Price, Director of University Extension, University of Minnesota; Executive Secretary, E. L. Bennett, Secretary of the Municipal Reference Bureau of the University of Minnesota; and Trustees, J. A. Farrell, Alderman, Duluth; Charles P. Hall, City Attorney, Red Wing, and J. N. Nicholsen, City Attorney, Austin.

Utah Municipal League.

The annual convention of the Utah Municipal League was held at Ogden, October 9-11. The first session was held in the city hall Tuesday morning. Mayor Abbott R. Heywood opened the meeting, after which was the address of welcome by O. J. Stilwell. Following Mayor Heywood's speech, Mayor W. Mont Ferry, of Salt Lake spoke. He spoke concerning the need of closer co-operation among the cities in the state, as follows:

We must develop a greater spirit of unity and co-operation among the cities of Utah. This Municipal League has been formed for such a purpose, and it behooves us as city officials of different cities of the state to see that that object is furthered by this league. The more we co-operate the more benefit will we receive individually and collectively, and the greater honor will we thus bring to our state.

The strength of this league is not felt completely enough among the state legislators, so that when legislation has been prescribed, which we, as municipal officials, could see was desirable and necessary, it has not been acted upon favorably. We represent the pulse of the real people more definitely than do the legislators. We daily come into contact with our supporters and know the needs of the community from first hand knowledge. Legislators are elected on a partisan ticket, while the personal element has more to do with our elections because we serve the people every day and serve them directly. We, therefore, are those who represent what the people want in the way of municipal legislation, and we, therefore, I believe should have a greater share in legislating for the cities of the state.

At the banquet in the evening, J. W. McHenry, mayor of Murray, opened the speaking at the banquet with an address on "Water Systems." He dealt with the supplying cities with water and many interesting sidelights were brought out.

"Finances of the Municipality" was the subject of an address by Leroy Dixon, city councilman of Provo.

Frank L. Hines, former superintendent of waterworks of Salt Lake City, was introduced and gave a demonstration of the pitometer.

The second day of the convention began with addresses by W. H. Folland, city attorney of Salt Lake, and by Dr. T. B. Beatty, secretary of the State Board of Health.

At noon a luncheon was given at the Weber club with the club as host to the delegates attending the convention. Following the luncheon, the delegates separated to meet again at 2 o'clock at Butler Way. At this meeting addresses were given by D. O. McKay on "Civic Improvements," and by William F. Long on "Building Roads and Streets."

An automobile trip through Ogden City was scheduled for 3:30 p. m. and the places visited included the Ogden Packing & Provision Company, the John Scowcroft & Sons' Company, the Utah Cereal Food Company, and the Utah Canning Company.

Attorney Folland, of Salt Lake, spoke on "City Charters and Their Value." The cities do not have sufficient legislative or governmental power, he said. The municipal officials have to supplicate the legislature, whose members for the most part do not know enough about municipal affairs to legislate intelligently for them, he said, and as a result necessary laws are not passed and the city exists in conditions similar to the provinces in mediaeval times. He called attention to the need for charters for cities to give them power of government considered essential to proper management of the city's affairs.

(Continued on page 437.)

PROBLEMS CITIES ARE STUDYING
WITH EXPERTS

SEWERS are being constructed by Maumee, O., plans having been prepared by Geo. Champe.

A SEWAGE DISPOSAL PLANT to cost about $182,000 is to be built by Waco, Tex. Plans were prepared by the engineer, P. Trevino.

Logan, O., is to improve its WATERWORKS. Preparations of plans by the consulting engineers, Burgess & Long, has been begun.

Arma, Kans., is soon to vote on a WATERWORKS SYSTEM. The city has retained as consulting engineer A. C. Moore.

A five-million gallon RESERVOIR to cost $275,000 is to be built by Waco, Tex. The engineer retained by the city to plan the improvement is N. Werinskiold.

A SEWAGE TREATMENT PLANT and SEWERS are to be constructed by Waseca, Minn. Plans are in course of preparation by the consulting engineer, L. P. Wolff.

DRAINAGE DITCHES are to be constructed by Armour, S. D., following the plans and specifications drawn up by the engineers, the Dakota Engineering Co.

Sand Springs, Okla., is to have an election on the question of issuing $40,000 bonds for extensions to the SEWER SYSTEM. The consulting engineers for the city are the Benham Engineering Company.

Brigham City, Utah, is extending its WATER WORKS DISTRIBUTION SYSTEM and improving its RESERVOIR. The firm of Brown & Kleinschmidt is acting in a consulting engineering capacity.

Sandwich, Ont., is to construct CONCRETE PAVEMENTS. The engineer for the improvement is J. J. Newman.

WATERWORKS extensions are to be made by Tomahawk, Wis. The engineer for the improvements is R. W. Richardson.

Richmond, Va., is to construct a VIADUCT. The engineers for the structure are the firm of Carneal & Johnson.

Eagle Lake, Tex., is to construct a SANITARY SEWER SYSTEM. The work was planned by the Norris Engineering Company.

Improvements are to be made to the WATERWORKS and SEWERAGE SYSTEMS by Ogden, Kans. G. P. Taylor is preparing plans for the work.

A SEWER SYSTEM and DISPOSAL PLANT are to be built by Seguin, Tex. Bartlett & Raney have completed work on the plans for the improvements.

A SEWERAGE DISPOSAL PLANT, to cost about $75,000, is to be voted upon by Pittsburg, Kans. The engineers for the improvement are the firm of Black & Veatch.

In constructing a number of BRIDGES the Wakefield Drainage District, Wakefield, Neb., has the consulting services of the Towle Engineering Company.

Extensive improvements are to be made by Miami, Okla., including some to the ELECTRIC LIGHT PLANT and WATERWORKS and SEWERS. Bonds have been voted for the work and the Hughes Engineering Co. is drawing the plans.

PERSONALS

Rinfret, Raoul, has been appointed city engineer of Shawinigan Falls, Quebec.

Schreiber, F. W. has been appointed assistant highway engineer of the South Dakota highway commission. For the past seven years Mr. Schreiber has been city engineer of Watertown, S. D.

Shuey, Arthur F., has been appointed superintendent of the Tampa, Fla., Waterworks Co. Mr. Shuey was formerly assistant engineer of the Florida State Board of Health.

Shertzer, Tyrrell B., formerly city manager of Portsmouth, Va., is now associated with the Hydrated Lime Bureau of Pittsburgh as eastern district engineer with headquarters in New York City.

Clark, D. D., chief engineer of the Bureau of Waterworks of Portland, Ore., has been forced to resign by ill health.

McCulloh, Ernest, previously connected with the city engineer's office of Los Angeles, and with the United States Reclamation Service, has joined the Charles L. Pillsbury Co., engineers, of Minneapolis and St. Paul, and will supervise the department of civil engineering of the organization.

Pincus, Sol, assistant sanitary engineer in the United States Public Health Service, has been assigned to duty in the extra cantonment zone of Camp McClellan.

Hamlin, Homer, who was formerly city engineer of Los Angeles, Cal., has opened an office for practice as consulting engineer and geologist in the Central building of that city. Surface and underground drainage, water supply, sewerage, sewage disposal, irrigation and allied engineering and municipal problems will be his specialties.

Older, Clifford, bridge engineer in the highway division of the State Department of Public Works and Buildings of Illinois, has been appointed acting chief highway engineer until a successor is appointed to the position of the late William W. Marr.

NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

PORT HURON ROAD ROLLER.

A "Three-Use" Machine of Sturdy Construction.

The Port Huron general purpose road roller is designed for three types of service: it is a complete road roller; has capacity and power necessary for continuous hauling, and for furnishing belt power. As a contractor's equipment for road-building it is highly efficient, labor-saving and time-saving, as idleness of the machine is considerably reduced. It has a boiler conforming in design, construction and inspection to A. S. M. E. regulations and carrying a pressure of 175 pounds, and with an actual strength five times as great. The engine has compound cyclinders and a single-faced flat slide valve balanced in pressures—both of which are vital factors in economizing on steam consumption for a given amount of work done. The balanced valve also prolongs the life of the engine and cuts down maintenance costs. The roller has a number of other features designed for time and labor economy.

The front roll is made up of two wheels or rolls 46½ inches in diameter with a 29 inch face, making the total tread 58 inches. The unusually large diameter of these front rolls is of great advantage in rolling loose earth or crushed stone, small rollers frequently shoving the loose material ahead of them, forming low spots and ridges which necessitate extra work and expense in releveling. The rims of both front and rear rolls are beveled ¼ inch across the face, which allows the crowning of the roads instead of flattening. Both front and rear rolls are provided with bushings which can be replaced when the bore of the hub becomes worn.

The frame is made of 6-inch steel, channels firmly riveted together and reinforced by truss rods. The yoke is pivotally connected to trunnions at the front and rear of frame, which allow a wide range of movement of the rolls in running over irregular surfaces. A vertical shaft 3¼ inches in diameter is cast solidly in the yoke and extends through the smoke box, having bearings at the top and bottom in which it is free to pivot. Without backing the roller can be turned around in a space of 25 feet wide—and with backing, in a space 15 feet wide. Rear rolls or drives are each provided with two spring-mounted steel scrapers, one in front and one at rear. The four scrapers are operated by hand lever at the engineer's platform by which they can be simultaneously applied or thrown back out of the way to permit the use of picks or lugs in wheel rims. Front rolls have adjustable angle iron scrapers at both front and rear.

The boiler is designed and built for high pressure operation. Riveting is done in such a way as to insure perfect alignment. Stay-rods run lengthwise through the steam space from the back head to front tube sheet. All holes for entering pipes are reinforced. The steel used is highest grade open hearth homogeneous steel—and the boilers have a factor of safety of five. The longitudinal shell seam of the boiler is of the butt and double strap type. The smoke box is of the extended type; heavier live cinders and fire brands lodge and die out in the bottom of the extension. The water bottom fire-box has a number of advantages: mud is not baked fast to the sheets so that it can be cleaned out easily; less air leakage; more complete control of draft during the entire lifetime of the boiler. The boiler jacket is full length, and is complete and neat.

The Port Huron compound engine is a tandem compound, the cylinders being placed one ahead of the other and both pistons being fastened to the same rod. A combination valve, made of a single casting, distributes steam to both cylinders. This valve is designed to overcome the excessive pressure crowding it against the seat and the bad effects resulting therefrom. This slide valve, while made of a single casting, is really a combination high and low pressure valve. This one-piece construction of the two valves makes for balance and if one gets out of proper adjustment, the other is out the same amount, and when the low-pressure valve is reset, the high pressure valve has been readjusted. The valve follows up its own wear as the natural wear does no harm.

Another important feature of the roller is the friction foot brake with which it is equipped. This brake holds the engine in the belt without blocking the wheels, and therefore acts as a safeguard against accidents. A speed change, a special patented device, is still another valuable feature. It does away with the frequent necessity of climbing up to the governor, and the engineer can change the speed without leaving his place at the levers.

The brake horsepower rating is 50, the nominal 16. The over-all width is 8 feet, 6 inches; the height 10 feet, 6 inches, and the length 18 feet, 8 inches.

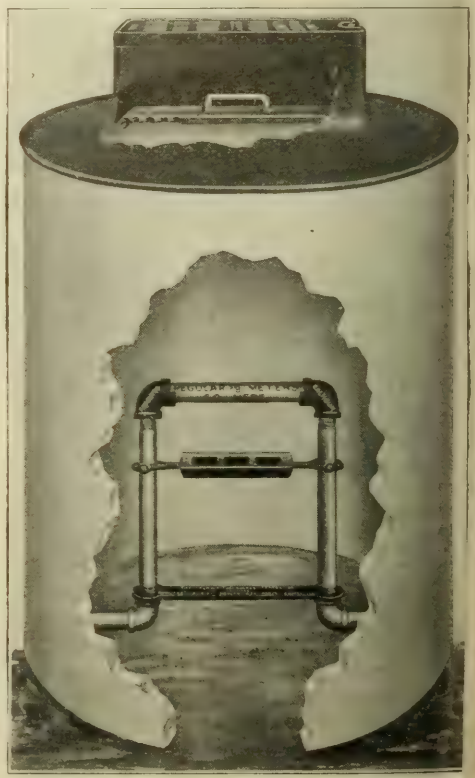
The accompanying illustrations show a side view of the roller and also a front view. The latter cut shows the construction of the front roll, the manner of mounting and the neat flexibility. This road roller is one product of a line of road machinery built by the Port Huron Engine and Thresher Company, Port Huron, Mich.

METER CONNECTIONS.

"Yoke" and "Turnbuckle" Unions With a Number of Improvements.

The modern "Calhoun" yoke and turnbuckle connections for meters are claimed o have a number of decided advantages over the ordinary straight or bent meter union. They are more simple to install and operate, and no wrenches or other tools are required in changing meters. Rigid installations are assured and leaks, stripped threads and broken risers are eliminated. The riser pipes stay where first placed and do not spring together or creep apart. The patent "stay" furnished with either type keeps the risers always the same distance apart and exactly right. Placing a meter takes only about a second—just as long as is required to reach down and give the hand wheel or turnbuckle a turn. There are no loose parts, everything staying in place, and nothing can be misplaced, lost or stolen. The operator does not have to lie down in mud or slush to force risers apart.

The adjusting screws are of bronze and cannot rust, stick, bind or cause similar trouble. The "yoke" adjusting screw pushes inward or pulls outward



MODERN "CALHOUN TURNBUCKI" METER CONNECTON.

the elbow into which it fits. The "turnbuckle" either pulls together or forces apart the elbows, thus making or breaking joint. The elbows have over one-inch water ways up to the point of contact with the meter. In neither type are there any parts which can get out of order or require repair, so that maintenance charges are eliminated. Both types have provision for securely sealing the meter so that it cannot be removed without detection.

Both connections can be had in sizes to fit any ⅝, ⅝-¾, ¾ or 1 inch meter. The connections are furnished complete with gaskets, ready for use. The "stay" is placed over the risers, the yoke or turnbuckle is put on, the ells screwed on and the connection is ready for the meter. The yoke is just as adaptable to basement installations as to those made in meter housings. All connections will take any meter of same size and fit perfectly.

The accompanying illustration shows the modern "Calhoun turnbuckls" connection installed in a "modern" meter housing, described recently in these pages. These connections are one of the line of water works products made by the Modern Iron Works, Quincy, Ill.

INDUSTRIAL NEWS

Cast Iron Pipe.—Prices remain at the same level after the big drop on all sizes, recently announced. Business, however, is dull. Quotations: Chicago, 4-inch, class B and heavier, $53.50; 6-inch, $50.50. New York, 4-inch, class B and heavier, $59.50; 6-inch, $56.50. Birmingham, 4-inch, class B and heavier, $48; 6-inch, $45; class A, $1 extra, all sizes.

The Roberts' Filter Manufacturing Co., Darby, Pa., has received a contract to build an eight million gallon gravity filter plant for the Newport News (Va.) Water, Light and Power Co. The Roberts company has just completed a three million gallon plant for Camp Meade, Admiral, Md., and is now engaged on the construction of a water plant for the Government's new shipyard at Hog Island, on the Delaware river.

Field for Tractors in Norway.—According to U. S. vice counsel Ralph A. Bernstein, Christiania, Norway, tractors are employed to some extent for road construction, and in a lesser degree for agricultural purposes. Practically none of those now operating in Norway, whether for road work or farming, are in excess of 20 horsepower. There is probably a field for more light tractors of 10 to 20 horsepower, and it is likely that they could be introduced most readily through an agency in this country familiar with all the requirements. Heavier tractors would not be practical in Norway. An American company has supplied many of the light tractors now operating in the farming sections of Norway, and these seem to be meeting with considerable success.. Road construction is conducted by the municipal governments, each town or city being responsible for the condition of the roads in a given area surrounding it. The larger cities own their tractors for operation on the highways. One of the reasons for the use in Norway of light tractors of 10 to 20 horsepower instead of heavier types is the fact that the roads in the farming district over which they must be driven often are too narrow and poorly constructed to permit of the passage of extremely large and heavy vehicles, such as tractors of 40 to 60 horsepower, of the types used throughout many parts of the western United States. Another difficulty which would confront the prospective introducer of heavier styles of tractors than those now employed would be the light construction of highway bridges spanning the rivers and mountain streams in the agricultural regions. The city of Christiania owns four tractors for street and road work of 15 horsepower each. They were constructed by the British firm of Aveline & Porter, Rochester, England, and were sold to the local city government through a Christiania agency. Tractors of this type have long been employed for highway construction here. The opportunities for disposing of new tractors to Norwegian municipal governments depend, naturally, on the completeness and efficiency of the equipment now owned by them. A list of Christiania dealers in agricultural implements may be obtained from the Bureau of Foreign and Domestic Commerce, Washington, D. C., its district or co-operative offices. (Correspondents should refer to file No. 92562.)

NEWS OF THE SOCIETIES

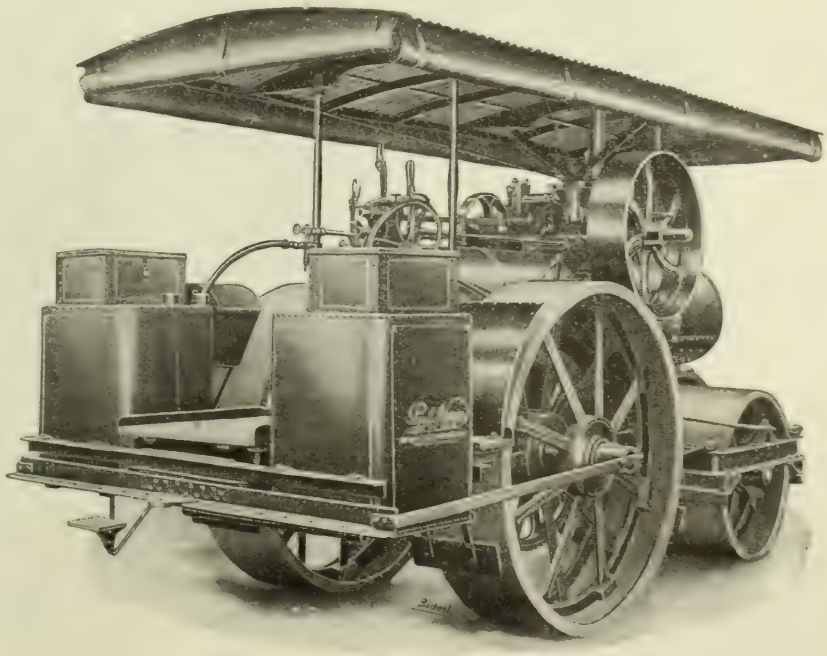
(Continued from page 435.)

He advocated also the consolidation plan for cities and counties such as the City and County of Denver and the City and County of San Francisco. This method facilitates government and greatly reduces taxes and expenses which have to be borne by the citizens. Especially in the case of Salt Lake City and Salt Lake County and Ogden City and Weber County, would this be valuable, he said, for the greater population of the districts is in the cities.

"We hear a great deal about the high cost of living these days," said Dr. T. B. Beatty in his address, "but we do not hear much about the high cost of dying. Do you know that the undertakers of the state are unnecessary, that these positions should be held by the governments of the various cities and towns, that this office should be a public office just the same as city physician and sanitary inspector Why should it cost a man several hundred dollars to be placed away in the ground? It costs so much to die that the average poor family suffers more contemplating the expense of the funeral than from the bereavement. And the undertakers take advantage of the grief and opportune moment to sell their goods when their patrons do not feel like protesting or arguing. This is only one of the improvements which we shall come to in the course of time."

Directors of the Poor and Charities and Corrections of Pennsylvania.

The 43d convention of the Association of Directors of the Poor and Charities and Corrections was held at Johnstown, Pa., Oct. 16-17. Officers for the ensuing year were elected and But-



SIDE AND REAR VIEW OF PORT HURON GENERAL PURPOSE ROAD ROLLER.

ler chosen as the place for the 1918 convention.

The election of officers resulted as follows:

President, Albert P. Roderus, Pittsburgh; First Vice President, W. W. Hawkins, Washington County; Second Vice President, Samuel E. Gill, Allegheny County; Third Vice President, Clark W. Baldwin, Delaware County; Fourth Vice President, S. A. Cramer, Warren County; Fifth Vice President, Fred Arensfield, Schuylkill County; Sixth Vice President, W. J. Trembath, Luzerne County; Seventh Vice President, Mrs. I. Roberts Comfort, Chester County; Secretary, Edwin D. Solensberger, Philadelphia; Treasurer, W. G. Theurer, Pittsburg; Assistant Secretaries—Miss Belle Chalfant, Pittsburg; James L. Reilly, Wilkes-Barre; Honorary Secretaries—L. C. Colburn, Somerset; Fred Fuller, Scranton.

The morning's session was marked by an address by W. H. Kuhns, Superintendent of the Lehigh County Home, Wescosville, who spoke on "County Home Management," O. M. Watts, Superintendent of the Butler County Home at Butler, discussed "A Truck Garden as an Asset to the County Home." "The Value of a Dairy in the County Home" was the subject of an interesting paper by Grant Boger, Superintendent of the Lebanon County Home.

"Conserving Food in the County Home" was the subject of a paper by Albert P. Roderus, Director of the Allegheny County Home, and Mrs. M. A. Bradt, Matron of the Rouse Hospital, Youngsville, Warren County, Pa.

"The Value of a Trained Nurse in County Homes" was the subject of a paper by George M. Strickler, Director of the Fayette County Home, Uniontown.

Another discussion was on "What Power Should Be Vested in Superintendents and Matrons of County Homes Should Important Questions Arise during Absence of Members of the Board?" James L. Reilly, Ashley, and George B. Jeffries, Uniontown, lead the discussions.

Highway Traffic Association of the State of New York.

The annual meeting of the Citizens' Street Traffic Committee of Greater New York was held at The Automobile Club of America, Wednesday, October 10th.

In accordance with the recommendation of the Executive Committee, at their meeting on September 26th, it was unanimously voted, that the name of "The Citizens' Street Traffic Committee of Greater New York" be changed to "The Highway Traffic Association of the State of New York."

The following changes in titles were made: Chairman to president; vice-chairman to vice-president; and the additional office of honorary president was created.

The nominating committee submitted the names of candidates who were elected as follows: Honorary president, William P. Eno; president, Prof. A. H. Blanchard; vice-president, David Beecroft; secretary, Elmer Thompson; treasurer, George H. Pride.

Indiana Conference of Charities and Corrections.

At the annual meeting of the conference, held at La Porte, Ind., Oct. 1-3, Evansville was selected as the 1918 convention city. Officers were elected as follows: Judge James A. Collins, president; F. J. Pitner, La Porte; T. F. Rose, Muncie; Miss Margaret Elliot, Indianapolis; and Donald Du Shane, Clinton, vice-presidents; Frank D. Loomis, secretary.

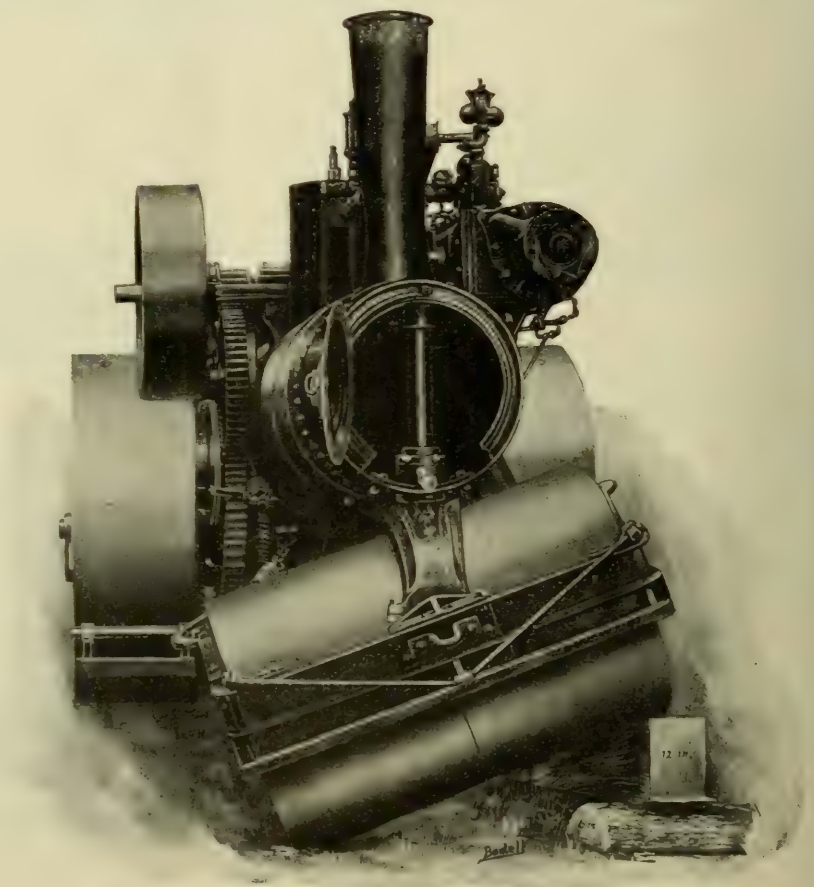
BOOK REVIEWS

WATER SUPPLY ENGINEERING.—The Designing and Constructing of Water Supply Systems. By A. Prescott Folwell. Third edition; rewritten. 484 pages; 121 illustrations. John Wiley & Sons, New York. Price, $3.50 net.

This new edition of a book that first appeared eighteen years ago differs quite materially from the first two editions, as explained in the preface, quoted below. A number of engineering schools have used it as a text book ever since its first appearance, and the suggestion of the professors so using it have been profited by in this revision. Because of the fact that the author is also the editor of Municipal Journal, no review of the book will be given further than a quotation of the preface, which is as follows:

"During the eighteen years since the first edition of this book was written there have been great advancements in waterworks theory and practice, especially in those branches having to do with the quality of water. Consequently, not merely a revising, but an entire rewriting, of the book seemed to be necessary if it was to continue to be of any service to waterworks students and practitioners.

"In the present edition the matter treating of water purification and the quality of water has been entirely rewritten at much greater length. That describing pumping machinery also is practically new throughout, and hardly a paragraph of the original text has been used without some change calculated to bring the subject up to date. This resulted in considerably increasing the length of a work that was already too long from some points of view, and Part II of the first two editions, dealing with construction, has been condensed to a single chapter, and Part III, dealing with maintenance, has been omitted altogether. Also the chapter on hydraulics has been omitted, since those using the book are assumed to be familiar with and to possess a text book discussing the principles of this subject. Several of the chapters have been rearranged so as to present the subject matter in a somewhat more logical order."



FRONT VIEW OF PORT HURON ROAD ROLLER.

Municipal Journal

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FIRE MARSHAL DEPARTMENT OF OHIO

The Work, Duties and Powers of the Fire Marshal—The Law and Incendiarism—Startling Results Following Declaration of War—Keeping Records—The Marshal's Allies in the War Against Fire.

By T. ALFRED FLEMING.*

The public has some queer ideas about a fire marshal's office, the occupant thereof being mentally pictured as anything from a fireman in white rubber coat and helmet to a Sherlock Holmes slipping along on clues, disguised in a false beard and wearing rubber soled "sneakers."

In peace times the work of a fire marshal's office is heavy enough, but in war times it grows by leaps and bounds. His duties can be roughly divided into advisory, corrective and penal.

FIRE HAZARD REMOVED BY OHIO STATE FIRE MARSHAL.
This fire wreck was removed only after considerable trouble with the owners.

Under the first head are treated all requests for information as to what to do regarding physical hazards to property, which range in scope from whether a lightning rod should be painted along with the house, to the proper manner of constructing a big building.

In his corrective capacity, the fire marshal must be a combination of diplomat, judge, jury and stern exponent of the law as it stands upon the statute books of his state.

The penal end of the work, of course, is the working up of arson cases, the securing of evidence that will "hold," and the arrest and conviction of the guilty persons. It does not stop there but, especially in war times, the department keeps track of when the sentences of convicted persons expire and what such arsonists are doing while they are free.

Taking them as a class, those who set fire to property are abnormally bright in covering up their tracks, especially those who burn property to get the insurance or for revenge. It is difficult to apprehend the pyromaniac also, but sooner or later he falls into the net for the simple reason that he or she chooses neither time nor place for his or her operations, but sets fire to anything that will bring the fire department rushing to the scene, be it a dog kennel or an apartment house. In Ohio, by far

*State Fire Marshal of Ohio.

A TYPICAL INSTANCE OF INVITING A FIRE.

the largest number of incendiary fires are caused either by pyromaniacs or by children too small to realize what heinous crimes they are committing.

THE LAW AND INCENDIARISM.

The value of the office of fire marshal depends entirely upon the strength of the law back of it. In my judgment, standard laws on the holding of suspects, the right of examination and search, the right of condemnation and removal of dangerous hazards, and a heavier penalty for the punishment of the crime of arson should be so broadened as to make easier the conviction of persons setting fire to property, either their own or that of others. Also, there should be closer cooperation between the legal machinery of the states and the fire marshal's department.

Incentive to arson seems to move in waves, the strength of which is determined by the state of the weather or exciting influences like pestilence or war. At all times there exist individuals whose minds are on the verge of breaking, and undue excitement from drink, personal habits, or excitement breaks down the partition between reason and insanity and a desire to do something abnormal follows. Often this takes the direction of homicide, but more often that of a desire to see something burn. This type of arsonist is difficult to guard against or to apply corrective measures to. After being placed in an asylum he may later appear to become mentally normal, but who can tell when the balance will again be disturbed? As an illustration, we now have under surveillance a young man who seems to be physically perfect, with regular features and good address. After setting fire to an apartment house he was sent to an institution, where he rapidly recovered. He was transferred to a state farm and in a short time caused a fire among the farm buildings that destroyed $15,000 worth of property. What can be done in cases like his?

The practical difficulty in working up the evidence in cases of ordinary incendiarism is that the evidence is burned up with the building. Moreover, people are afraid to tell what they know for fear of being burned out themselves by the arsonists.

With our entering into the war, the plotter and alien enemy conspirator became important factors. These men are of the shrewdest mentality and add to this an absolute disregard for death. They aim at destroying foodstuffs, vessels, terminal points and munition factories. This class of criminal comes under the jurisdiction of the secret service, but every fire marshal in the land must cooperate to the fullest in the fight against needless waste. This work is hazardous, at times extremely so.

INSPECTION WORK.

The fire marshal's office must at all times see that conditions are not allowed to exist that may breed fires. In this work, constant patrols must be maintained on inspection and reinspection work. Formerly in Ohio this branch of work engendered much ill feeling and led to recourse to court proceedings, property owners regarding the visit of the inspector as a personal affront and his recommendations as arbitrarily impertinent. Education is rapidly changing this, and the cases of trouble over corrective orders are now but one-eightieth as numerous as formerly. In part this condition is due to diplomacy on the part of inspectors and in part to the fact that the state fire marshal's orders are upheld by the courts. Intelligent persons have been made fire preventionists and strong allies of the fire marshal by having demonstrated to them that the changes ordered in their properties will reduce their insurance rate and make safe the lives and properties around them.

ATTIC ABOVE THEATRE THAT NEEDED CLEANING UP.

Following the declaration of war, the insurance companies of the country enlisted their field forces to a man in the work of conservation inspection. In Ohio, 250 of the ablest, brightest and most diplomatic men in the fire insurance business at once became an invaluable cooperative force, acting in unison and harmony with our regular inspectors. Special attention was directed first to the safety and storage of foodstuffs, coal, munitions and the like, and was continued into the home, office, mill and mine. Conditions bordering on the incredible were found, among which might be enumerated: Alien watchmen on guard over vital necessities of the army, water supply clogged and useless for fire protection, antiquated and useless private fire equipment or no equipment at all, "plants" of infernal machines timed to blow up storehouses and wholesale plants at night, fire hydrants located with several railway trunk lines between them and the factories they were supposed to protect, great manufacturies with no fire fighting force and no one responsible for the up-keep and instant use of the fire fighting equipment, and factories with no night watchmen. And as to physical conditions, the invitations to fire that were found were legion.

The result has been that Ohio, like other states where there has been co-operation with the insurance men, is safer today in war time than it was formerly in time of

peace. This is the result of intelligent cooperative conservation.

RECORDS.

Unless the fire marshal's office keeps up a thorough system of records, the work of the department goes for nought. There should be a clear and complete history of each inspection and order, so that the fire marshal can at any time know instantly the status of any particular case. Deputies should keep their records up-to-date and the fire marshal should know hour by hour just where his men are and what they are doing, for no one can tell at what moment the entire force may be needed at a given point or when one man may need the assistance of four or five others.

Records of every fire in his state should be available at the fire marshal's office, including the class of building, cause of fire, damage to building and to contents, time of discovery, and such additional data as the fire chiefs think necessary in individual cases.

A complete history of each arson case, the picture of the arsonist, his sentence and where he is *now*, should be an important feature of the records.

Every inquiry and letter, however trivial it may seem at first, should be answered immediately. This is official courtesy and is also diplomacy, and every friend a fire marshal's office makes is an addition to his force of operatives. The same rule should apply to personal telephone calls.

ALLIES IN THE WAR AGAINST FIRE.

Many allies can be enlisted in the war against fire. School teachers, if given short, snappy facts as a starter, can apply in their schools fire prevention lessons as they appear daily in the papers. Civic bodies, societies of credit men, superintendents of schools, chambers of commerce, boards of trade, boy and girl scouts, women's clubs, and a thousand other bodies can be enlisted in the work. Insurance clubs, associations and societies are invaluable aids. Information received by the fire marshal from these or any other source must of course be regarded as strictly confidential. Boys and girls can often secure information that the best of trained detectives could not; and even more important, they exert an influence for good at home and also upon their companions.

The fire marshal should be upon the best of terms with the personnel of the fire department throughout the state and see to it that his deputies are likewise. Nothing makes more for rapid reduction of fire hazards than hearty cooperation. When fire officers and inspectors know that the power of the fire marshal, backed by all the judicial machinery of the state, is behind him, they can accomplish wonders.

The fire marshal can aid and advise the installation of cooperative fire fighting units in rural communities; and to the resident far from fire hydrants and water mains, he should furnish ideas with which to mobilize the power of his community for fire fighting.

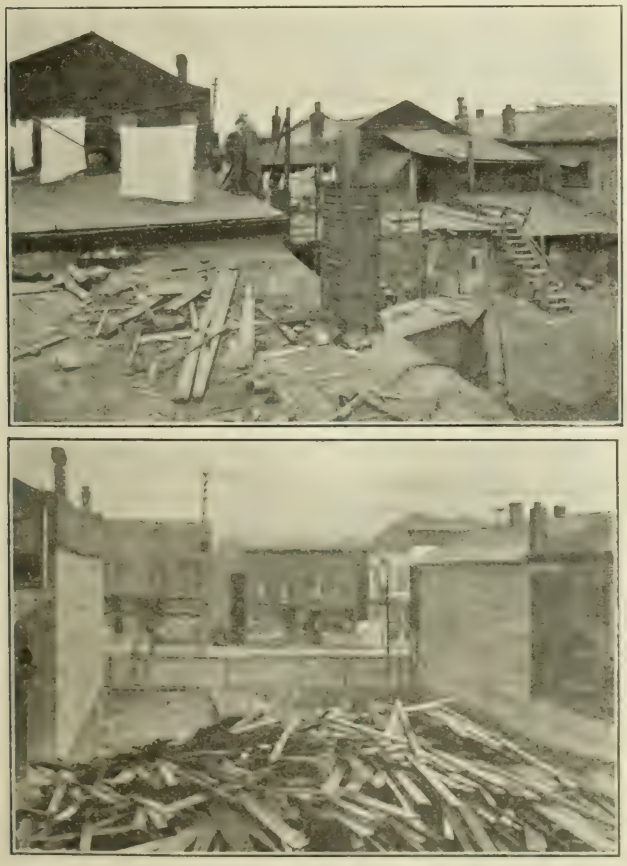
Perhaps the greatest ally of all is the press. Through periodicals, newspapers and pamphlets the fire marshal can reach the public as in no other way. He should send out bulletins on timely topics and see that they reach the homes. Strong newspaper and magazine editorials are splendid ammunition. It is a good plan to have a story ready for the reporters every time they visit the office.

The officer, when he finds it necessary to order changes in a property, should use judgment in allowing the owner a reasonable time in which to comply, looking the ground over quietly before this time has expired to see if any attempt has been made toward remedying the defect. Material is high now and labor difficult to obtain, and under conditions like these the fire marshal must use tact and judgment. While the law may permit him to tear down or rebuild dangerous constructions, circumstances may not justify such action. Diplomacy exercised in such a case may win a strong ally to fire prevention. The mailed fist must be used at times, but diplomacy should be tried first.

THE OHIO OFFICE OF FIRE MARSHAL.

The office of Ohio State Fire Marshal was created by the Ohio Legislature in 1900, only one state, Massachusetts, having such office at that time. Prior to the passage of the law there had been only 41 convictions for arson in 10 years, and in 60 of the 88 counties of the state there had not been a single conviction. In many places public sentiment was opposed to the prosecution of incendiaries by the state.

Each fire insurance company doing business in the state pays one-half of 1 per cent of the gross amount of



BUILDING IN LARGE OHIO CITY BEFORE AND AFTER BEING RAZED BY STATE WRECKERS.

INSPECTOR LOOKING AT A FIRE RISK IN AN ALLEY.

HOT ASHES DUMPED BETWEEN SHED AND FENCE.

premiums paid in the state, after deducting returned premiums and considerations received for reinsurance. This fund is used by the fire marshal, any portion remaining unexpended at the end of the year being turned in to the general revenue fund of the state.

The department consists of the marshal, who appoints a first deputy, second deputy, and chief assistant; also such clerks and assistants as are necessary. The state is divided into 20 districts, all reporting daily to the main office in Columbus, where either the marshal or his chief deputy is constantly on duty. The marshal has complete command of all the office and field forces and is executive head, the deputy and chief assistant acting in his absence. The field men are employed in inspection and investigation work, such as finding incendiary cases, etc. All work is laid daily before the fire marshal, so that he may be in touch with any situation at any time. During war times, of course, his duties are multiplied and include close attention to the requirements of the War Council. Among the assistants are men specially trained in electrical and other branches.

The marshal and his assistants and deputies have power to compel attendance of witnesses and require the production of any books or documents deemed pertinent, and to administer oaths. A fine of $100 and a jail sentence is provided for refusal to testify or for disobeying lawful orders of the marshal or his deputies. The marshal may conduct his investigation in private and may separate the witnesses. He may at any time of day or night enter upon and examine any building or premises where a fire has occurred and other buildings and premises nearby. The force may also at all reasonable hours enter any buildings for making examination. The department can repair, tear down or demolish dilapidated hazards and correct defective chimneys, wire and gas connections, as well as hazards of explosive oils and other liquids. It enforces its orders by prosecution when necessary.

The department makes surveys of communities either upon request or when the need is evident. In making such surveys, particular attention is paid to the possible future needs as well as the protective needs of the present. Distances between fire hydrants, fire and domestic pressure, water supply, etc., are carefully studied and plans by experts are prepared. Fire protection is required to keep pace with the growth of the community and in many instances a complete revisal of the system has lifted a town or city out of the dangerous hazard class. In one typical instance, a town of 12,000 population, the fire pressure was found to be but 37 lbs., and even this could not be maintained. There was a deadlock between council and mayor over $1.00 per connection for putting the town in a safe class; improvements had stopped and the peril of a bad fire was constantly present. As the result of the department's activity, the municipality now has a new well and a reservoir, and a hydrant pressure of 85 lbs. can be maintained indefinitely.

The law requires the local marshal, chief of the fire department, or, where there is neither, the mayor or township clerk, to investigate the cause, origin and circumstances of each fire and endeavor to determine whether it was due to carelessness or design, such investigation beginning within two days and being conducted by the state marshal personally if he thinks it necessary. One of the results of the work of the department is the discouraging of incendiarism. For the first eight months of 1917 the department secured 60 convictions, as compared with 41 in the ten years prior to the passage of the law.

For Standardization.—The department heartily endorses the standardization of hydrant and hose connections, although the promotion thereof is mostly carried on by the Fire Protection and Water Supply Committee of the Ohio State Fire Prevention Association; and Ohio is believed to lead in this matter of standardization. Cooperative fire chiefs' associations have been organized, each covering a 50-mile radius from some large city as a center, and the couplings and outlets have either been standardized or such provision made that, by the use of adaptors, the aid of all fire-fighting apparatus within that radius can be massed at the scene of conflagration. The Ohio Inspection Bureau has obtained dies by the use of which couplings of certain diameters can be made to conform to the standards and these are loaned without cost to municipalities and the work of adaptation is done by the fire departments themselves, with very little cost.

FIRE PREVENTION.

Work Done by State and National Organizations—Underwriters' Laboratories' Labels—Inspection by Local Firemen—Aid by Federal Departments.

A large part of the credit for the fire prevention propaganda must be given to the fire insurance organizations; the fact that they are acting largely from selfish motives in no way diminishing the public value of their work. One of the most important results of their activity was the organization of state and national fire prevention associations, the membership of which consists largely of insurance men. The state associations hold regular meetings and have secured much legislation providing for better building codes and fire regulations and more effective fire departments. In cooperation with local and state authorities they have secured the inspection of towns with a view to discovering and having remedied the more serious fire hazards. The National Fire Protection Association, with headquarters in Boston, Mass., investigates and keps records of all large conflagrations, issues valuable fire prevention bulletins and in general carries on an educational campaign.

Several magazines are published in the interest of fire prevention, including "Fire Protection," the official organ of the Fire Marshals' Association of North America; "Construction" and "Safety Engineering" of New York.

The Fire Marshals' Association of North America is an organization of the state fire marshals, of which there are 33 in the United States and Canada. Through this association the fire marshals cooperate with each other in every way possible and at the annual convention compare experiences and devices and are generally addressed by outside fire prevention experts.

The Underwriters' Laboratories is a corporation chartered in 1901, to maintain laboratory and inspection service on materials, devices and products and to enter into contracts with the owners and manufacturers of such materials, devices and products, respecting the recommendation thereof to insurance organizations. It has grown greatly in the extent of its work and renders an important and far-reaching service to the cause of fire prevention. Its work is carried on under the direction of the National Board of Fire Underwriters. It aims to secure and give out the best obtainable opinions regarding the merits of materials, appliances and systems in respect to fire and accident hazards. With it are connected about 150 engineers and assistants at the Chicago plant, together with others in the New York testing station, inspectors at factories, etc. When the product of a given manufacturer has been accepted as satisfactory, following suitable investigation, inspectors are stationed at the factory to follow the daily run of materials through the various processes, conducting such tests as are specified, and should the goods be found to be suitable they attach the Underwriters Laboratories' labels. In addition, tests are made on labeled material purchased from dealers and on samples of labeled products taken out of service.

Insurance inspection bureaus not only inspect property for making an insurance rate to fit the hazard, but make recommendations for the lessening of the hazard to the mutual advantage of insurer and the insured.

Probably most valuable of all, where it is thoroughly and systematically carried out, is the inspection of buildings made by local fire departments in many and an increasing number of cities.

In addition, credit men's associations have taken up the subject and held special meetings where the fire problem was the topic of discussion. For ten or fifteen years past the Federal Government has been giving more or less attention to the fire problem and a number of bulletins have been published by the Geological Survey and the Bureau of Standards giving the results of thorough investigations in the various phases of the fire waste problem, its causes and remedies. The work of the states, chiefly effected through state fire marshals, is described in this issue.

For the above outline of fire prevention work we are indebted to a report of L. T. Hussey, state fire marshal of Kansas, from which it has been greatly condensed.

THE NEW YORK BUREAU OF FIRE PREVENTION

Organization and Jurisdiction—Work Performed by Each of the Several Divisions—Supervision of Structure of Buildings and Auxiliary Fire Appliances—Combustibles and Explosives—Electrical Inspection—Education and Propaganda.

By ROBERT ADAMSON, Fire Commissioner, City of New York.

After the Triangle Shirtwaist Factory fire, in New York City, in which 146 persons lost their lives, an inquiry was conducted to determine what department or bureau of the city or state government was responsible for allowing the existence of the conditions that caused the tragedy, and it developed that no public official could be held responsible. The Hoey Bill was then introduced into the State Legislature to fix the responsibility for such conditions in the future by creating a bureau which should have jurisdiction over fire prevention matters in the city of New York. The bill became a law in October, 1911. The Bureau of Fire Prevention thus created worked with a temporary force until May, 1912, when a permanent force was established under civil service requirements.

There can be no doubt that fire prevention in New York City has paid. For the first five years of the Bureau's activity, from 1912 through 1916, the total fire loss was $7,909,582 less than for the five years preceding. This represents an average reduction of $1,581,916 a year. During the three years from 1914 through 1916 the record was even better, the reduction averaging over $2,000,000 a year. Nor do these figures tell the whole story. In reading them it should be remembered that many factors have militated strongly against a reduced fire loss for this city since the beginning of the war. A suit of clothes destroyed by fire today represents a loss appreciably greater than would be represented by the same suit destroyed five years ago. Furthermore, owing to increased business activity, the average factory burned down today would have a far larger stock of goods to be destroyed than the average factory five years ago. Exports from the Port of New York have increased $2,000,000,000 in the past two years, creating a new and complex waterfront hazard; hazardous trades such as chemical manufacturing have had a mushroom growth, spawned by the war; and in the intense pressure of new business and war-created activity, standards of individual carefulness have been lowered. It is not surprising, under these conditions, that New York's fire loss last year was greater than during any year since 1912. It is surprising, considering the adverse odds, that so substantial a reduction in the fire loss can be shown for the entire period during which scientific fire prevention work has been practiced here.

JURISDICTION AND ORGANIZATION.

Under § 780 of the Charter, the Bureau of Fire Prevention has supervision in one way or another over approximately 394,518 buildings in Greater New York. Of these, 237,831 are one-family and two-family houses, while the remaining 156,687 buildings include hotels, theatres, factories, schools, warehouses, lofts and other structures.

The powers of the Bureau are defined in the City Charter, the Code of Ordinances, and the Lockwood-Ellenbogen Law of 1915, which transferred to the Fire Commissioner the enforcement of the fire prevention sections of the State Labor Law, previously within the jurisdiction of the State Labor Department.

The Bureau proper employed, in 1916, 246 persons, of whom 148 were classed as inspectors and assistant engineers, and the remainder as administrative and office force, examiners, process servers, etc. It contains the following divisions: Division of Violations and Auxiliary Fire Appliances; Division of Combustibles; Division of Places of Public Assembly; Electrical Division; Division of Examiners; Division of the Plan Room; Recording Division; Stenographic Division.

Not all of the work connected with fire prevention, however, is done by members of the Bureau. When the

present administration began in 1914 we found pending over 13,000 complaints of dangerous conditions in buildings, and approximately 13,000 orders not complied with. It was impossible for the limited force of the Bureau to clean up this mass of accumulated orders and complaints and at the same time keep abreast of current work.

To meet the situation, we inaugurated, early in 1914, the policy of utilizing members of the uniformed force for certain kinds of fire prevention work. This policy has been so successful that it has been steadily developed. In general, we have followed the plan of turning over to the uniformed force all inspection work not requiring a background of specialized technical training, including almost all first inspections on complaints of dangerous conditions; and in addition members of this force have been given authority to issue verbal notices of minor violations of the laws and ordinances found in the course of their inspections. These verbal notices cover such matters as the accumulation of rubbish, posting of "No Smoking" signs, and other house-keeping conditions. Each of the 301 company commanders is required to cover the conditions in the buildings in his district approximately once each month.

Through this cooperation with the office of the chief of department, the Bureau of Fire Prevention has been enabled to concentrate on the correction of conditions requiring important structural changes, and of those house-keeping conditions that it has been found impossible to correct through verbal notices. Furthermore, the inspection reports of company commanders serve to turn the attention of the Bureau of Fire Prevention first to those buildings that present the most serious dangers to life and property.

As an example of what the uniformed force accomplishes, it might be said that in 1915 firemen made 1,500,000 inspections and corrected 50,000 conditions by verbal request. The number of fire prevention orders issued in 1915 was 10,830 less than the number issued in 1914, wholly because of the inspections and verbal notices of members of the uniformed force. This represents an immense saving in clerical work alone. The most recent phase of fire prevention work handled by the firemen, that in connection with the Labor Law, will be mentioned later in this article.

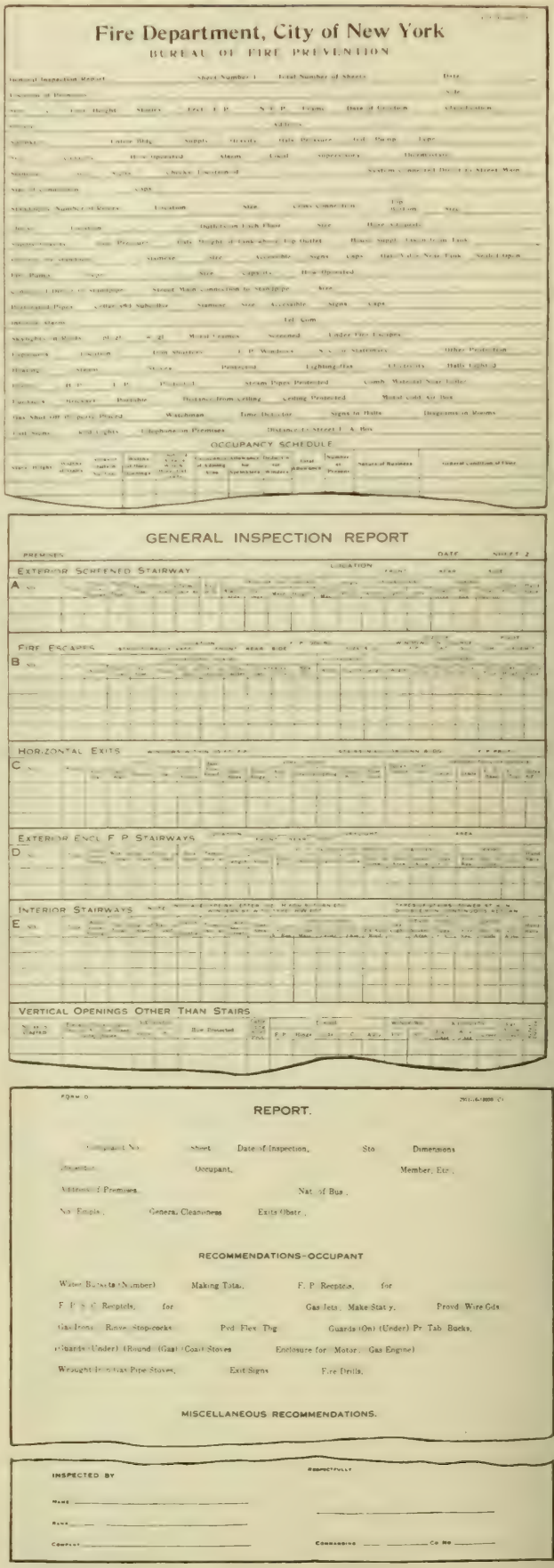
WORK DONE BY THE BUREAU.

The work done by the Bureau of Fire Prevention can best be described by taking up each division in order.

Structural Changes, Housekeeping, Fire Appliances.—The Division of Violations and Auxiliary Fire Appliances is the largest and most comprehensive division of the bureau. It deals with structural features of buildings, housekeeping conditions, and auxiliary fire appliances, including standpipes and sprinkler equipments. It also conducts laboratory tests and examinations of materials and appliances and prepares reports for the information of the Board of Standards and Appeals, the Board of Appeals and the Board of Hazardous Trades. These boards hear appeals and establish standards and general regulations for and pass upon the efficiency of material used in construction, as well as various devices such as fire extinguishers, panic bolts for exit doors, containers for volatile inflammable oils, and so on.

The inspectors for this division are chosen from the established civil service list. After appointment, they go through a period of field training with competent inspectors varying from six weeks to three months. They are then given minor work on their own responsibility. An inspector's real value begins after about a year's service.

Most inspections made by the division are complete inspections of buildings. Typical floor plans must be



FORMS USED BY BUREAU OF FIRE PREVENTION OF NEW YORK CITY.

Top form—Sheet 1 of General Inspection Report. Middle form—Sheet 2 of same report. Bottom form, inspector's recommendation as to improvements to be made by occupant.

prepared by the inspector as part of his report, which generally occupies several pages. These reports are turned over to the examiners for examination and the preparation of orders based on the violations noted.

After fifteen days a reinspection is made. If the order has not been complied with, a copy of it is left by the inspector. If it is again uncomplied with, it is referred to the enforcement squad for the preparation of a complaint and the issuance of a summons. Members of this squad must possess a knowledge of court procedure, since they become the department's representatives as complainants in court. Fire Department cases are handled by the corporation counsel, whether for criminal action or the collection of civil penalties.

As an example of the orders issued by this division, the following might be quoted:

YOU ARE HEREBY ORDERED AND REQUIRED, within .....days from the date of the service of this order, to install a WET EQUIPMENT FOR ENTIRE BUILDING.

A separate and distinct system of AUTOMATIC SPRINKLERS, with heads approved by the Fire Department, supplied with water from tank or tanks located on roof, and not connected in any manner with standpipes or house service, shall be placed on the ceiling of every floor at such intervals as will protect every square foot of floor surface when said sprinklers are in operation.

AUTOMATIC SPRINKLERS shall also be placed wherever practicable in all offsets, rooms or other places where deemed necessary.

The entire system shall be connected to one or more approved 2-way 3-inch Siamese connections with proper signs, placed on outside of building above curb level, in a position accessible for use by the Fire Department.

Drawings showing location, sizes and connections, with duplicate affidavits, must be furnished to the Fire Department for all sprinkler work.

These drawings must be to scale, and shall consist of such floor plans and sections as may be necessary to show clearly all such work to be done, and must show all partitions, stairway enclosures, elevator shafts, and any other physical conditions affecting the sprinkler system.

Prints will be accepted.

The said sprinkler work shall not be commenced or proceeded with until drawings and specifications, in detail, shall have been filed and approved.

No modification of the approved drawings and specifications will be permitted unless amended drawings and duplicate descriptions covering the propose changes are filed and approved.

Neglect or **refusal** to comply with the above order may render you liable to **fine** or **imprisonment**, or both.

SPRINKLER SYSTEM IN NEW YORK HIGH SCHOOL.
Installed by order of Bureau of Fire Prevention, making safe a building that otherwise would have had to be abandoned.

Certain classes of orders are served by a process server. Others, for which no formal service is necessary for the prosecution of a civil suit, such as notices covering violations of the mandatory provisions of the Labor Law, are mailed.

One of the most important phases of the work handled by the Division of Violations and Auxiliary Fire Appliances is the enforcement of the fire prevention sections of the State Labor Law, transferred to the Fire Commissioner in October, 1916. These cover exit, occupancy, and housekeeping conditions in factory buildings as defined by the Labor Law. It is estimated that there are approximately 12,000 factory buildings in the city. From the beginning of the year to September 18, the Fire Department made complete surveys of 3,900 of these buildings, and by the first half of the year 15,000 violations had been noted.

AUTOMATIC TESTING DEVICE FOR SPRINKLER HEADS IN MECHANICAL LABORATORY OF BUREAU.
Sprinkler head in tester, before application of heat.

The great mass of work involved in the enforcement of the Labor Law has had to be done by the Fire Department, so far without an increase of force or additional funds. This has been accomplished by extending the policy of utilizing the uniformed force. Each company commander has been made responsible for the inspection of the factory buildings in his district. In districts where there were an unusually large number of factory buildings, the work was done by a Central Building Inspection Squad consisting of forty firemen selected for their knowledge of the law and of building construction. This squad made 510 complete surveys from July 20 to September 8. Each complete inspection involved the detailed measurement of stair width, risers, treads, stair halls, aisles, exits, fire escapes, windows, etc., as well as noting the condition of standpipes, hose, water supply, check valves, pumps, outside siamese connections, sprinkler equipments, etc.

These surveys are now going forward at the rate of one hundred a week. Recommendations for the owners and for the tenants, based on the inspections, are recorded on separate sheets. The fireman also makes a diagram to scale. In the making of these diagrams some of the men have shown latent talent as draftsmen.

The work of the Division of Violations on the Labor Law begins where that of the uniformed fireman finishes. The division receives all building inspection reports, scans and checks them carefully, issues written orders where required under the mandatory provisions of the law, makes reinspections where necessary, and carries cases to the courts when compelled to take legal action. Under this plan, approximately 3,122 orders had been issued by the bureau up to October 1, and it had in addition disposed of approximately one-half of the 6,020 pending orders transferred to it by the State Labor De-

partment. The task could not have been adequately handled by the bureau with its present force without the cooperation of the Bureau of Fire Extinguishment.

In this connection, another aspect of the work of making factories safer has been handled by the uniformed force. This is the work of conducting fire drills. The Labor Law requires that the owner and not the tenant shall conduct fire drills in factories. Where there were many tenants, the owners found this impossible and the law remained a dead letter. The Fire Drill Squad of fifteen picked firemen was organized to provide a service the owners were unable to provide for themselves as well as to ensure the safety of the occupants. From October to April this squad conducted 2,774 drills, including drills in schools, involving several hundred thousand persons. The good effect of these drills has been shown in several fires where the occupants were able to leave the building in safety because of their previous training.

Handling of Combustibles and Explosives.—One of the most interesting and difficult aspects of the work of fire prevention in New York City is that handled by the Division of Combustibles. This division supervises the storage and use of dynamite, chemical plants, motion picture films, garages and dry-cleaning establishments, refrigerating plants, etc. There has been a considerable development in the work of the division owing to the world war.

Perhaps the most important work the division has accomplished under the present administration is the handling of the film situation. It was found that inflammable motion picture films were stored throughout the city without any special safeguard in all types of buildings, many non-fireproof and non-sprinklered, contrary to the provisions of the Code of Ordinances. Disastrous film fires outside the city impressed upon the department the necessity of having conditions remedied in New York City, with the result that all inflammable motion picture film is now stored in fireproof sprinklered buildings with proper ventilated vaults. The seriousness of the problem is indicated by the fact that there are, in addition to the smaller plants, a half dozen buildings in which are stored from twenty to fifty or more tons of film. A number of film fires have occurred, but in most cases these were extinguished before the arrival of the apparatus by the automatic sprinkler system. There have been two disastrous film fires in the last three years. In one case the occupants had been ordered to vacate and were negotiating for other quarters at the time the fire occurred. In the other, the fire was due to the occupants having misrepresented conditions and concealed films from the representatives of the Fire Department.

The regulations governing the storage and use of dynamite have been perforce made more stringent since the outbreak of the war. Dynamite can only be stored and used under authority of a permit from the Fire Department. These permits are issued to persons who have filed bonds with the city as indemnity in case of accident. The actual handling and safeguarding of dynamite is done by persons who have been licensed by the Fire Department after examination. Permits for storage and use are not issued until the magazine and the work has been passed upon by inspectors of blasting.

While dynamite is stored in a magazine it is inspected daily by a member of the uniformed force. The city is divided into seven districts, with an inspector of blasting responsible for each district. This work includes both day and night inspection. Since the outbreak of the war, the number of watchmen on magazines has been doubled under orders of the department; and where dynamite is used in large quantities and over an extensive territory, particularly in subway construction, the Police Department has a special policeman watching the work.

The extent of the hazard involved in this part of our work is indicated by the fact that in ten consecutive days, selected at random, the two largest powder concerns handled 14,700 pounds of dynamite, or an average of nearly 1,500 pounds a day, in a city closely built up, and in most cases under streets containing heavy traffic and crowded office buildings.

A license from the Fire Department is required for the legal operation of any chemical or technical plant. Owing to the very extensive development of this kind of work since the supply of German chemicals was cut off, the department has not been able to keep in as close touch as it has desired with the industry, and in several cases has only learned of the introduction of a new plant after a more or less serious fire. For example, it was discovered by accident that large quantities of phosphorus were being brought into the city contrary to the provisions of the Code of Ordinances, owing to the dislocation of the ordinary routes of trade by the war. This phosphorus was being stored in all kinds of buildings at a considerable risk, owing to the fact that if the water used for packing the phosphorus leaks away the material spontaneously oxidizes in air. The situation was so complicated that the provisions of the law could not be enforced without entailing a considerable hardship on the industries involved. It was met by learning all the firms that were likely to handle phosphorus and impressing upon them that the only condition on which the handling of it would be tolerated was that the department be promptly advised of all arrivals and shipments of the chemical. This arrangement has been lived up to, entailing a great deal of work on the part of the Division of Combustibles in following up the various shipments and seeing that they were handled with the proper safeguards.

There was a new development in 1916 in the handling of refrigerating plants. Fatal explosions had occurred in such plants and great difficulty had been experienced in the extinguishment of fires because of liberation of suffocating gases. The problem of safeguarding the plants was little understood, even by refrigerating engineers and experienced operators of refrigerating plants. Refrigerating engineers and some of the best operating engineers in the city were consulted and eventually the assistance of the American Society of Refrigerating Engineers was obtained. Experiments were carried on at the plant of the National Ammonia Company in Philadelphia and these resulted in the adoption of specific regulations, including a design of a water and ammonia mixer. The regulations were approved by the fire commissioner April 28, 1916.

Ample time was allowed for compliance with these regulations, which were compiled in such a manner as to be easily executed. Compliance with the regulations has already averted accidents in a number of cases, as shown by the investigation of inspectors. In other cases, accidents have occurred that would have been avoided had the regulations been complied with. The city of Detroit has adopted the New York regulations practically word for word, including the drawing, and copies of the regulations have been furnished upon request to the governments of a number of states.

The refrigerating work in the Division of Combustibles is in the hands of men with engineering training. Chemical houses, manufactories and establishments are inspected by graduate chemists, one of whom holds a doctor's degree. The inspection of garages is handled in a routine manner by members of the uniformed force acting for the division. In fact, in order to bring the

work of the division up to date, the services of the uniformed force were utilized on the routine inspection of all types of hazardous occupancies excepting those requiring special training and experience, such as oil plants and refineries, wholesale drug houses, film storage houses, refrigerating plants and the like.

Theatres and Places of Public Assembly.—The Division of Places of Public Assembly has jurisdiction over the following approximate number of buildings in the city:

	Number	Seating Capacity
Theatres	239	327,808
Motion picture theatres	766	359,175
Public dance halls	778	180,587
Athletic clubs	29	75,462
Baseball parks	3	71,300
Total	1,815	1,014,332

The division inspects theatres once a year for renewal of licenses, and periodically to see that equipment is in order, and polices theatres and places of public assembly during performances. The license renewal inspections and later inspections are concerned with those features of a theatre that have to do with public safety in case of fire or panic, the adequacy and availability of the exits, and the equipment provided for controlling and isolating the hazards involved in a theatrical production. These instruments may be listed as: Exits; fire curtains and automatic skylights; sprinkler systems and standpipes; fireproof walls; partitions and fire doors; portable appliances; fireproof scenery.

During the present administration, the policy has been followed of withholding theatre licenses until violations were corrected, and the pressure thus brought to bear has insured a high standard of compliance with the law. On a few occasions it has also been necessary to suspend licenses temporarily until bad conditions were remedied or the orders of the department complied with. During 1916 systematic tests of hose were made in all theatres and exhibition buildings under the jurisdiction of the division, and about one mile of defective hose lengths was found and replaced.

To every performance in every theatre where there is a stage and scenery is used, the department sends a uniformed fireman. He must reach the theatre one-half hour before the performance begins, and must make a complete inspection of the entire building. He must open and shut all exits, try all fire doors, examine the asbestos curtain with rope attachments, skylights, and extinguishers, and make a general survey of all the protective devices. He must make at least three tours of the building during the performance, and see to it that halls and exits are not blocked by standees.

In addition, inspections are made for boxing clubs, common-show moving picture theatres, moving picture exhibitions, and dance hall licenses. All large commercial exhibitions, bazaars, dances, etc., in the larger exhibition buildings like Madison Square Garden, the Grand Central Palace and some of the city armories, are also supervised and controlled by this division. Inspections are made at the request of the Department of Licenses, violations noted, orders forwarded, reinspections made, and approvals forwarded when conditions have been corrected. Moving picture theatres are inspected approximately twice each week.

The policing work and licensing inspections for dance halls and moving picture houses are done by uniformed firemen. The theatre inspectors are men graded as assistant engineers, with past experience which would make them especially competent to deal with fire protective devices.

(To be continued.)

THE STATE FIRE MARSHALS.

Description of the Work of Their Respective Departments Furnished by the Marshals of Nineteen States—Powers, Aims and Achievements.

The office of state fire marshal has been created in the states of Alabama, Arkansas, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Minnesota, Mississippi, Montana, Nebraska, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, South Carolina, South Dakota, Texas, Virginia and West Virginia. Other states have officials who act to a certain extent in the capacity of fire marshals, among these being the deputy chief of the state police of Massachusetts and the fire prevention commissioner of Tennessee. The powers and purposes of the fire marshal in the several states, together with some of the details of the operation of the office, have been furnished by the marshals at our request and the information so furnished is presented in the following statements:

Arkansas. Bruce T. Bullion, Fire Marshal. The office was created by the legislature on March 7, 1917, under the title of insurance commissioner and state fire marshal. It is supported by appropriations out of the state's revenue fund. The commissioner has one deputy, one assistant and a clerk. The marshal is appointed by the governor, must be a citizen of the state and of well-known business ability, having had at least three years' experience in some branch of the insurance business. He holds office for 6 years and receives $3,000 salary. The deputy marshal must be a lawyer of recognized ability and receives $2,400 salary. The assistant commissioner receives $2,000 and the clerk $1,200.

The marshal is directed to enforce all state laws relative to prevention of fires, fire alarm systems and fire extinguishing equipment; the storage, sale and use of combustibles and explosives, fire escapes and provision for exit from factories, schools and all other places in which numbers of persons congregate from time to time; the suppression and investigation of the causes of fires, giving assistance in the prosecution of incendiaries. He has power to summon witnesses and administer oaths. He shall furnish information to any citizen concerning how to construct buildings so as to lessen fire hazards, and shall disseminate information concerning the best known methods of fire prevention. He shall require teachers of all educational institutions to have at least one fire drill every month.

All fire, tornado, marine, life, accident and health insurance companies not incorporated in Arkansas but doing business there must pay 2 per cent of the premiums received each year. This money is to be paid to the state treasurer, and while nothing in the act states the reason for requiring such payment or the use to which it is to be put, it presumably is to provide funds for the support of state fire marshal.

The marshal makes no special fire surveys. He does not receive reports of all fires, but only of those which are supposed to be of incendiary origin, and investigations of fires are made only on request of certain local officers. The office has been in operation for only 6 months, but already has investigated a number of such fires and has [illegible] indictments, none of which has yet been tried. A monthly bulletin is issued and sent to all the newspapers of the state.

Illinois. John G. Gamber, Fire Marshal. The office was created in 1909, a Division of Fire Prevention being created as part of the state Department of Trade and

Commerce. The division was organized on June 1, 1911, the two years delay being due to the failure of the legislature to make appropriation for the office. The office is maintained by a special levy of ¼ of 1 per cent on all insurance premiums in the state. The division is subdivided into two special departments known as the Department of Investigation and the Department of Inspection, with a deputy at the head of and in full charge of each. The matter of publicity and education is carried on continually by the department as a whole. At present the staff consists of the fire marshal, an assistant fire marshal, a supervisor of inspections, a supervisor of investigations, a deputy in charge of the Chicago office and 20 field deputies. The main office is located at Springfield, the state capitol, and a branch office is maintained in Chicago.

The marshal has power to enforce the department's orders as to fire hazard conditions, and to subpoena witnesses and compel them to testify in matters pertaining to the investigation of fires.

Surveys of communities are made. In case of a large city, a corps of inspectors is assigned to the work by blocks and a report made to a deputy in charge. In the case of small cities, one or two men are assigned to the work and report direct to the Springfield office. In classifying these surveys, it is found that in a great majority of cases rubbish and defective electrical conditions are those demanding most attention. The marshal also advises communities to organize for fire prevention work and carries on a campaign of education among school children, and urges cities and villages to improve their fire fighting equipment and facilities.

The fire marshal receives reports of all fires, those occurring in Chicago being sent to the Chicago office and forwarded each month to the Springfield office; other fires being reported direct to the latter office. All fires are investigated by the local officials and those reported as suspicious are investigated by the marshal. As a result of the investigations made by him and followed up by indictments and convictions, incendiarism has been materially reduced and incendiary reports are very few as compared with previous years. Some progress has been made towards standardization of hydrant and hose connections and more attention will be given to this phase of the work in the future.

Iowa. Ole O. Roe, Fire Marshal. The office of State Fire Marshal was created in 1913. The marshal, appointed for four years, receives $2,500 annually and his deputy $1,800, with traveling expenses, the total expenditures of the office being limited to $13,500. Chiefs of fire departments or officials acting in their stead receive 50 cents for each fire reported satisfactorily to the marshal and in addition 10 cents per mile to township clerks for traveling to the fires. The fire marshal is to investigate the cause of a fire whenever he thinks it necessary, the local fire chiefs or village clerks being required to investigate the causes of each fire in their respective territories, especially as to whether it was incendiary in origin, and report to the State Fire Marshal within one week of the occurrence of the fire. If the marshal believes that there is sufficient evidence to charge any person with the crime of arson or conspiracy to defraud, he is to arrest such person and furnish evidence to the prosecuting attorney, together with testimony and names of witnesses.

The marshal endeavors to reach, through the public schools, all children for the purpose of instructing them concerning the causes and dangers of fires. He also endeavors to educate municipal authorities with a view to secure better building ordinances, more efficient inspecting of buildings and better enforcement of ordinances already enacted for the prevention of fires. The law requires all teachers of public and private schools in buildings of more than one story to have at least one fire drill each month; also to instruct the pupils, in at least one lesson each quarter of the school-year, with reference to the causes and dangers of fires, the fire marshal furnishing bulletins containing outlines for such instruction.

The fire marshal may appoint any persons as state inspectors, who shall have powers to enter and inspect buildings and report to the marshal any dangerous conditions found therein.

The marshal must keep in his office a record of all fires occurring in the state, including data as to ownership, value, amount of insurance, cause of fire, etc.

Kansas. L. T. Hussey, Fire Marshal. The Department of State Fire Marshal was organized April 1, 1913. The organization consists of the fire marshal, chief deputy, chief clerk, stenographer and five deputies. Four of the deputies give their entire time to inspection work and investigation of incendiary fires, while the fifth gives his time largely to educational work. The funds for the support of the department are obtained by a special levy on the premiums collected by fire insurance companies within the state.

The department has power to enter and inspect premises and investigate fires, to hold inquisitions in the case of fires of suspicious origin and to prosecute parties suspected of arson, to regulate the handling, storage and transportation of gasoline and other inflammable and explosive materials, and to order the remedy or removal of serious fire hazards. The law provides penalties for failure to comply with reasonable orders issued by the department.

In conjunction with the State Fire Prevention Association the department makes frequent surveys of selected cities and towns. Ordinarily a large number of defects are found and the property owners or occupants are advised of the hazards and, where those hazards are of a serious nature, formal orders are issued by the department. Advice is frequently given by the department to communities relative to organizing for fire prevention work and improving the fire fighting equipment.

The law requires that all fires be reported to the department, but only those of suspicious origin are especially investigated by members of the department. The department maintains a clipping service by which it obtains from newspapers of the state all items relating to fires. The reports received from the fire chiefs and other officials are checked with these clippings, and whenever a clipping tells of a fire that has not been reported, a letter is mailed at once to the proper party asking for a report on this fire. In this way the statistical records of the department are made very accurate and complete.

Loss from fires of incendiary origin has been reduced steadily since the organization of the department. In the year 1916, 125 new cases of supposed incendiarism were investigated, ten incendiaries were convicted and one sent to the insane asylum. Many cases were dropped because of insufficient evidence or groundless suspicion. The marshal believes that a thorough and systematic inspection of every town in the state at least once every year is an imperative need, and that the cost of the service would not be a drop in the bucket as compared to the saving to the people of the state. Unfortunately, however, the funds at his disposal permit only a small amount of this to be done by his department.

A constant campaign of publicity and education is

carried on through the press, the issuing of bulletins of special and general nature, the delivering of addresses and the use of slides and moving pictures. The standardization of hydrants and hose connections has been promoted to a considerable extent.

As indicating one result of the work of the fire marshal, the number of incendiary fires for the years 1913-1916 inclusive have been as follows: 172, 140, 130, 126. During the same four years reduction in the losses from incendiary fires has been $113,565, or about 40 per cent.

Louisiana. W. M. Campbell, State Fire Marshal. This department was organized about thirteen years ago. Its work consists of the education of the people in fire prevention, spreading information regarding the causes of fires, the means of prevention and the true significance of fire waste; the inspection of premises and ordering the removal of conditions conducive to fires; the investigation of fires of unknown and suspicious origin and the prosecution of the incendiaries; and the gathering and compiling of fire statistics. Mr. Campbell's report for 1916 states that he made 385 investigations as to hazardous coditions in the city of New Orleans as a result of complaints; while in three towns a house to house inspection was made and the results published. During the year, 470 fires reported as of unknown or supposed incendiary origin were investigated by this department.

Maine. E. J. Carter, Insurance Commissioner. The duty of fire marshal was placed upon the Insurance Department in 1897. The work has been carried on through employment of investigators or inspectors as conditions seem to warrant and as funds were provided for carrying on the work. Authority is given to hold hearings, summon witnesses, etc. No surveys of communities have been made. The department has consulted with communities in fire prevention work. All fires in the state must be reported to the office by the municipal officers and by insurance companies, and those regarded as suspicious are investigated whenever possible. The commissioner believes that incendiarism has been reduced, the records of the department for the past 20 years supporting this belief. The work of the department has been given publicity by means of bulletins, pamphlets, and the press. The matter of standardizing hydrant and hose connections has not been taken up by the department.

Maryland. Wm. Mason Shehan, Fire Commissioner. In 1916 the legislature abolished the office of fire marshal and transferred the duties thereof to the Insurance Department, without changing the law as to the powers and authority of the office. It made such insignificant appropriation, however, for the conduct of the office and the salary of the deputy commissioner, who was to be in charge of its administration, that it has been practically impossible to do anything. Under the law, the Insurance Department is called upon to investigate such fires as appear to be of incendiary or suspicious origin. Little or no appropriation is made for the prevention of fires. The law also empowers the department to take action with regard to fire-escapes, etc., but the appropriation has limited action to the investigation of the most serious of the suspicious fires. It is expected that the legislature meeting in January, 1918, will make an appropriation which will permit extending the service.

Michigan.—Frank H. Ellsworth, fire marshal. The State Fire Marshal Bureau was organized in 1911, the state commissioner of insurance being made ex-officio fire marshal and his deputy the ex-officio deputy fire marshal. The purpose of the law was to reduce the fire waste in the state and provide for the investigation of suspicious or incendiary fires. It provided for the appointment of inspectors and an office force and gave the marshal power and authority to make inspections of property throughout the state. At the present time there are four inspectors out in the state and three clerks in the office. The inspectors, in addition to inspection of fire hazards and investigations, make two inspections of the moving picture theaters in Michigan each year. As in other states, fire chiefs or other local officers must report each fire, receiving 25 cents for each report; and fire insurance companies also must report each fire in which they are interested.

The marshal can summon witnesses, punish as a misdemeanor refusal to answer or produce documents, etc., as in the Pennsylvania law. He can order changes made in buildings in order to reduce the fire risk, but such orders may be changed by a circuit judge if considered by him to be too stringent; the judge's decision as to what an owner must do being final on both state and owner, and failure to comply with the terms of such decision forthwith being punishable as contempt of court, and in addition the fire marshal can carry out the order at the expense of the owner, and if such expense is not paid it shall be filed as a lien on his property plus a penalty of $100.

In connection with the Michigan State Fire Prevention Association, organized through the efforts of the fire marshal and composed of the special and state agents of the various insurance companies, inspections are made each month of the business and manufacturing districts of one or more towns or cities and recommendations and orders are given for the correction of fire hazards therein.

Only suspicious or incendiary fires are investigated. The bureau is not able to say whether or not incendiarism has been reduced, but it has secured a considerable number of convictions and severe prison sentences have been imposed by the judges. Up to date it has found that over-insurance was responsible for the great majority of incendiary fires, but at present it is investigating a number for which it is convinced German agents or sympathizers were responsible. Acting assistant fire marshal Robinson reports: "We absolutely know that in many communities we have succeeded in stamping out the firebug who operates for the collection of his insurance. We are no doubt safe in stating that incendiarism in Michigan up to the beginning of the war had been reduced one-half at least."

The bureau issues a fire prevention bulletin twice a month and in addition sends out considerable literature to schools and fire chiefs and reaches the public through the press. The bureau has always urged the standardization of hose and hydrant connections in Michigan, and the State Firemen's Association and the Upper Peninsula Firemen's Association cooperate in this work.

North Carolina. James R. Young, Insurance Commissioner and State Fire Marshal.

The Insurance Department was established in 1899 and the Insurance Commissioner made ex-officio fire marshal. As fire marshal the insurance commissioner has nothing to do with insurance companies except to get whatever aid he can from them in his fire prevention work. As insurance commissioner he is required to place all insurance upon state property and to inspect the property regularly and see it is in proper condition. No state building can be erected until the plans have been approved by the commissioner so far as the protection of the building from fire is concerned and the safety of the inmates.

The commissioner is in charge of the Fire Marshal Department and has between $25,000 and $30,000 to spend, with power to appoint deputies and to organize the work and to have it carried out according to his judgment. He is allowed large discretion in the work. The work is

not only advisory and educational but the commissioner has the power to enforce his orders and to order corrected anything that is likely to produce fire or is dangerous in case of fire. He is also charged with the enforcement of the State Building Code and of the laws in regard to fire-escapes or proper exits. The commissioner has two deputies whose principal business is to investigate fires, get up evidence, etc. He also has one man whose principal business is to advise with the municipal authorities as to what they need in the way of fire protection, and how they can get the most out of what they have, and also to assist in training their fire departments. He is also charged with looking after buildings and inspection work.

Another deputy is the state electrical inspector, and his special duty is to look after local electrical conditions and inspectors and see they do their work, enforcing the law. All of these men spend their time in inspecting cities and towns and other risks throughout the state when not engaged in their special lines.

The commissioner receives reports of all fires in the state from the sheriffs of the counties outside of incorporated cities and towns, and from the officers of the towns where the fires occur within the corporation. Regularly he only has suspicious fires investigated, but is gradually expanding the work to take in all fires. Incendiarism and fires have been reduced under the work of this department, as is shown by reports covering fires in the state.

The insurance commissioner endeavors to use for publicity and educational work every possible means. He keeps in close touch with municipal departments, especialy fire departments, enforcing the building and inspection laws, inspects in person and through deputies named above, as well as two women representatives of the Department of Farmers', Teachers' and Other Institutes and the public and private schools and colleges throughout the state. The department issues a large quantity of literatrue, signs, etc., in the work; has a moving picture machine, films and slides that are exhibited free throughout the state; holds annual institutes for the benefit of the state electrical inspectors and of the officers of the fire department. Of course there are other ways in which the publicity and educational work is carried on as observed in the Fire Prevention Day bulletins which are isued weekly and a page of plate matter issued monthly. The former goes to newspapers and all interested parties, and the latter is now going to and being used by the local newspapers who represent about 250,000 subscribers.

North Dakota. H. L. Reade, Fire Marshal. The office of fire marshal was created in 1913, the State Firemen's Association having backed the demand for the law. The marshal and his force is under the control of the State Insurance Department. The department consists of a marshal, chief assistant and deputy, any additional help needed being appointed by the commissioner of insurance with the consent of the governor.

The marshal enforces his orders through the county sheriffs and the state's attorneys backed up by the attorney general. He can subpoena witnesses, punish for contempt and has other broad powers for investigating suspicious fires. He has entire supervision over all places where a number of people congregate for any purpose, and can condemn or close up any place which he considers a menace to life or property through fire. During the four years of its existence, the marshal has done nothing in the way of making surveys of communities, but he advises communities in the organization of fire prevention work and has supervision over fire departments and fire fighting equipment. He receives reports of all fires from the fire chiefs, mayors or chairmen of town boards, and also from the insurance departments representing the different companies doing business in the state. He investigates only suspicious fires.

Ohio.—For this state, see article on page 439 by the state fire marshal, T. Alfred Fleming.

Oregon.—Harvey Wells, Insurance Commissioner. The department of insurance was organized under a law that became effective on May 21, 1917, the insurance commissioner being designated as ex-officio state fire marshal without additional compensation. The organization is limited by law to a deputy fire marshal and two assistants, with such clerical force as may be found necessary; but all municipal fire marshals, fire chiefs, police chiefs, town marshals and constables are designated as assistants. The marshal can make regulations concerning explosives and inflammable materials; is required to inspect all buildings and premises and has police power to require dangerous conditions to be remedied. For providing adequate protection for the lives of persons in places where they work, live or congregate, his authority is merely advisory.

The department is now engaged in making surveys of towns which have requested it, the cooperation of the local fire chiefs being obtained when possible. Insurance companies and adjusters are required to report all suspicious fires and also the total claims paid each month. Already a number of incendiary fires have been investigated and in all cases indictments have been secured against the offenders. Newspapers, municipal officers and business organizations have greatly assisted the department in publicity and educational work.

Pennsylvania. G. Chal. Port, Fire Marshal. The Department of the State Fire Marshal was established in 1911. A quite complete abstract of the act creating the department and the supplement of 1913 is given elsewhere in this issue. While the act provides for a first and second deputy, there are at present in the department 4 special deputies, 13 deputies, and approximately 2,700 assistants, together with the necessary clerical force for the proper conduct of the work. The duties of the deputies are the investigation of all fires of suspicious origin, the prosecution of the crime of arson, and the inspection of buildings for the purpose of removing all fire hazards, either by demolition of dilapidated buildings or correction of conditions. The department is continually making surveys or inspections of communities throughout the state, all properties being inspected and orders being served upon the owners or occupants of such properties as show conditions which need to be remedied. The fire hazards most generally found are the general dilapidation of buildings especially liable to fire and endangering other properties; accumulation of rubbish and the improper storage of gasoline, kerosene, naphtha and explosives. Fire Marshal Port believes that incendiarism in Pennsylvania is being gradually reduced and that, although fires for mercenary reasons probably will always continue, their reduction to a minimum is possible by vigorous investigation and successful prosecution.

Tennessee. E. D. M. Gillenwaters, Commissioner of Fire Prevention. The Department of Fire Prevention was created by the legislature in 1915. It is supported by a tax of one-half of 1 per cent on the net premiums of all fire insurance companies doing business in the state. The department consists of a commissioner, three deputies, a chief clerk and assistant clerk (both clerks being deputies). In addition there is in each county of the state and in nearly every town of the state an assist-

ant who reports to the department the fires in his district, and who is paid on a fee basis. The commissioner and all deputies have authority to inspect all premises and require the remedying of hazardous conditions; also to investigate fires of suspicious origin. Surveys of communities in the state are made by the State Inspection Bureau. While reports are received of all fires, only the suspicious ones are investigated. The department from time to time issues bulletins concerning fire prevention.

Texas. S. W. Inglish, State Fire Marshal. Prior to 1913 there had been for two years a State Insurance Board. In 1913 the office of state fire marshal was created, the marshal being a member of the State Fire Insurance Commission, which commission promulgates all maximum fire insurance rates to be used by stock companies issuing insurance in the state. The marshal has two men actively engaged in fire investigations and three in inspections for eliminating fire hazards. The Fire Insurance Commission's rate inspectors make surveys of the communities for the purpose of publishing fire insurance rates, and the engineering department advises communities in organizing fire prevention work and in improving fire fighting facilities. The marshal receives reports on fires from some 300 city fire marshals throughout the state, and all fire insurance adjusters report direct to him on losses adjusted. He investigates all fires of a suspicious nature called to his attention. The engineering department of the insurance commission, together with officials of the State Volunteer Firemen's Association, are promoting the standardization of fire hydrants and hose couplings, work in which connection has been so satisfactory that it is hoped to secure a complete standardization throughout the state before long.

The 1913 law gives the state fire marshal power to take testimony and secure prosecution under practically the same conditions as under the Pennsylvania law; also to inspect buildings and require the destruction or repair of any which show unusual fire hazards.

Wisconsin. M. J. Cleary, State Fire Marshal. The office of fire marshal was created in 1907. A tax of ⅜ of 1 per cent is levied upon the net annual premiums received by insurance companies operating in the state, which money is used for the support of the fire marshal's department. The department consists of the insurance commissioner, who is ex-officio state fire marshal, a chief assistant, five deputies and a reporter. Until July 1, 1917, the department had not only police powers in the investigation of incendiary losses, but also had power of condemnation of such fire hazards as were a menace to public safety; but since July 1, the fire prevention and safety activities of the department have been transferred to the Industrial Commission, the expense of which is still borne by the fire marshal's department.

Surveys of communities have been made by the department in the inspection of fire hazards and fire conditions surrounding the same. The chiefs of fire departments or their representatives are required to make quarterly inspections of general fire conditions and report the same to the fire marshal's department with the necessary recommendations. The fire marshal's department then pursues the matter of reinspection and, where conditions warrant, issues an order to remedy the same.

The department joined with the State Fire Prevention Association in organizing fire prevention work in the communities of the state. It supervised the standardization of fire departments, and it was only upon the recommendation of the fire marshal's department that the several fire departments of the state were able to secure their fire department dues. The department receives reports of every fire loss in the state, which are classified and kept on file. The report for the year 1916 showed 6 per cent of the fires as being of incendiary origin, as compared with 10 per cent in the first annual report of the department.

British Columbia. H. G. Ganett, Superintendent of Insurance. The Department of Insurance was established in 1911 for the purpose of licensing and regulating insurance companies doing business in the province. The act confers upon the department certain powers of inspection. The fire insurance companies are required to report to the department all fires on which they carry insurance and the state and district authorities also report all fires and the causes assigned and values destroyed. Suspicious fires are investigated and convictions of guilty parties secured when possible.

Ontario. E. P. Heaton, Fire Marshal. This office was organized in Otcober, 1916, and since then has devoted all energies to diagnosis of the fire waste of the province, the results of which investigations are published in a "Monthly Public Service Bulletin," issued by the government. The department has not yet seriously undertaken any fire prevention work, but such is now under consideration and plans are being laid for future operations. The fire marshal is appointed by the lieutenant governor, who also may appoint as many deputy fire marshals as he considers necessary, which deputies possess the powers and perform the duties of fire marshal in the respective localities for which they are appointed and are under the direction of the fire marshal. The salaries of fire marshal and deputy fire marshals and the necessary officers and clerks are fixed by the lieutenant governor, and the respective duties of these are prescribed by him.

The fire marshal has authority to investigate the causes of fires, inspect buildings, order dangerous conditions remedied, order the withholding of payment of insurance money for a period not exceeding 60 days pending investigation of the cause of the fire, and report to the Crown Attorney any evidence of arson or other illegal act. The fire insurance companies must report fires damaging property insured by them within three days after they receive notice of such loss. Expenses of the department are to be met by a tax of not more than one-third of 1 per cent of the premiums received by licensed companies and 1 per cent of the loss claimed by any person on property insured in a company not licensed under the Ontario Insurance Act.

Saskatchewan. The office of Fire Marshal was established in 1913 and in 1916 was combined with that of superintendent of insurance. The expenses of the office are met by a tax of one-third of 1 per cent on the premiums received by insurance companies. The department consists of a fire marshal, a deputy fire marshal and three inspectors. Two of the inspectors investigate the origin of fires and at the same time inspect cities, towns and villages from a fire prevention standpoint. Two men are assigned to the inspection of risks. The fire commissioner and deputies, inspectors and other assistants are all appointed by the lieutenant governor and their salaries fixed by him. Fire chiefs, mayors and village overseers are made assistants of the fire commissioner, as in many states of the United States, and are required to report all fires. The fire commissioner is required to enforce laws concerning fire prevention, combustibles and explosives, fire alarm systems and fire extinguishers, fire-escapes and exits, and the suppression of arson, and to investigate causes of fires. The various methods of investigating fires, summoning witnesses, remedying fire hazards, etc., are similar to those in many of the states. Standardization of hydrant and hose connections has not been considered by the department.

TABLE No. 1—THE CITY AND THE FORCE.

City and State	Population.	Area of city square miles.	No. of regular men.	No. of officers.	No. of volunteers.	Percentage of volunteers in 1915.	1913.	1911.	Effect of replacing volunteers by paid men?	Salary of regular men?	Has it been increased during past year?	What per cent?	Trouble in getting enough good men?	Is Dept. under civil service?
Alabama:														
Brewton	2,500	1	none	..	25	..	..	..	.....	..	....	..	....	No
Gadsden	20,000	5	4	4	25	40	40	30	none	$21 $66	Yes	10	No	No
Huntsville	9,832	2	9	2	14	..	..	..	more efficency	55	Yes	11	No	No
Selma	19,000	..	20	3	10	..	..	..	more efficient service	60	Yes	10	....	No
Arizona:														
Bisbee	15,000	2½	10	3	none	none	none	..	cut losses; increased efficiency	115	Yes	15	at times	No
Douglas	13,000	1½	9	3	5[1]	..	..	..	.....	125[2]	Yes	25	No	No
Nogales	6,300	2	..	8	50	all	all	all	.....	....	....	..	No	No
Phoenix	26,000	4.35	28	10	120	13	95	96	increased efficiency	85-110	No	..	No	No
Arkansas:														
El Dorado	5,000	4	..	..	10	all	all	all	.....	....	....	..	No	No
Ft. Smith	35,000	13	28	5	..	..	..	..	.....	80	Yes	10, 15 & 20	Yes	Yes
Jonesboro	10,000	..	3	3	10	..	..	..	.....	70-85	Yes	15	No	No
Little Rock	65,000	22.5	36	14	none	none	none	none	.....	80-95	new scale	..	....	No
Prescott	3,500	..	14	5	14	..	..	..	.....	....	....	..	No	No
Russellville	5,500	2½	..	..	12	..	..	..	.....	....	....	..	No	No
California:														
Alameda	30,000	23.05	21	3	28	..	..	..	.....	95	No	..	Yes	partly
Berkeley	67,500	10	50	24	none	none	none	none	.....	80-90-100	No	..	No	No
Bishop	7,700	..	..	4	25	25	25	25	none	....	....	..	No	No
Coalinga	5,000	¾	2	1	16	15	15	15	.....	125	Yes	10	Yes	No
Emeryville	3,000	1.13	5	1	..	..	..	..	.....	75-100	No	..	....	No
Hayward	4,000	2	2	10	25	..	..	..	.....	75	No	..	No	No
Long Beach	35,000	13	33	7	..	..	..	..	.....	75-85	No	..	No	No
Modesto	9,600	9	5	2	20	20[6]	20[6]	..	.....	65-100	Yes	..	Yes	No
Monrovia	5,500	5	14	4	12	75	67	50	marked efficiency	45-90	No	..	No	No
Oakland	250,000	36	275	5	..	..	..	..	.....	115	....	..	Yes	Yes
Palo Alto	6,000	1	1	7	55	all	all	all	.....	80	No	..	No	No
Pasadena	47,000	13	54	..	..	..	..	..	.....	80-90	Yes	5	No	Yes
Petaluma	7,000	4	..	..	14[1]	..	..	..	good	100-125	No	.	No	No
Pomona	15,000	12.5	4	1	30	..	..	..	very good	75	No	..	No	No
Redlands	12,000	16½	3	3	13	60	60	60	.....	85-100	No	..	No	No
Richmond	22,000	29	20	3	none	none	all	all	reduction in losses	90-105	Yes	20	No	No
San Leandro	4,500	6	2	2	8	..	..	..	.....	85	Yes	..	No	No
San Rafael	6,000	..	2	6	100	..	..	..	.....	90	No	..	....	No
Santa Ana	8,429	..	4	3	20	75	75	60	very beneficial	80	Yes	7	No	No
Santa Barbara	23,000	..	5	..	..	..	..	..	.....	95-100	Yes	15-25	Yes	No
Santa Monica	15,000	..	11	3	14	50	50	60	excellent	80-100	No	..	No	Yes
Santa Rosa	12,500	1½	6	2	6	..	..	..	.....	80-90	Yes	7	No	No
Stockton	42,500	7½	37	10	none	none	none	none	.....	102	No	..	No	Yes
Ventura	4,000	2	none	..	16	90	70	70	.....	....	....	..	....	....
Watsonville	6,000	1¼	5	5	45	..	..	..	....	75-100	Yes	15	No	No
Whittier	8,000	3½	15[3]	5	15	100	100	100	.....	5	No	..	No	No
Colorado:														
Boulder	12,500	..	5	3	..	..	..	..	.....	75	No	..	Yes	No
Colorado Spgs.	50,000	..	42	12	..	..	..	..	.....	75-85	No	..	not yet	Yes
Ft. Collins	12,000	5	6	3	none	15	30	30	good	65	No	..	No	No
Grand Junction	7,754	2	4	1	8	62	62	75	more efficiency	75	No	..	No	Yes
Idaho Spgs.	2,200	2	..	10	65	..	..	..	.....	....	....	..	No	No
Longmont	5,000	1½	2	1	10	same	same	..	.....	65	No	..	Yes	No
Trinidad	15,000	5½	9	3	6	33	50	60	increased efficiency and discipline	100	Yes	10	No	No
Salida	5,500	3	3	..	1	..	..	..	.....	85	Yes	6	No	Yes
Connecticut:														
Bridgeport	180,000	..	173	44	none	..	..	..	efficient department	1,400	Yes	16⅔	No	No
Danbury	24,000	7	15	3	200	..	..	..	very good	1,000	No	..	No	No
Greenwich	3,600	9	2	12	150	..	..	..	.....	1,200	No	..	No	No
Hartford	130,000	18	157	10	..	..	..	..	.....	1,320	Yes	10	Yes	No
New Britain	60,000	13.2	41	14	none	..	..	..	.....	1,000-1,200	Yes	10	Yes	Yes
New Haven	150,000	18	130	40	55[4]	0	0	0	.....	1,050 & up	Yes	8	No	Yes
Norwich	30,000	5.7	19	7	40	..	..	..	.....	....	....	..	....	....
So. Manchester	18,000	5	..	10	160	100	100	100	.....	78	....	..	No	No
Stratford	15,000	35	1	1	100	100	100	100	.....	1,300	Yes	..	Yes	Yes
Suffield	4,100	..	..	..	50	..	..	..	.....	....	....	..	No	No
Torrington	25,000	14	7	8	40	100	100	100	good	2.75 & 3.75	Yes	10	No	No
Waterbury	95,000	29	64	21	..	..	..	..	.....	1,277.50	Yes	25c per day	No	No
Wethersfield	2,500	12	..	4	50	100	100	100	.....	....	....	..	No	No
District of Columbia:														
Washington	331,069	70	503	129	..	..	..	..	.....	1,254	Yes	5 & 10	Yes	Yes
Florida:														
Daytona	6,000	6	2	..	38	..	..	..	.....	77-85	No	..	Yes	No
Lakeland	9,000	1½	5	1	8	98	100	100	more men for quick service	60	Yes	..	rone	No
Plant City	4,000	..	..	4	16	..	..	..	.....	....	No	..	No	No
Quincy	3,570	1½	2	2	20	100	75	75	.....	1,500	Yes	15	No	No

St. Augustine...	5,000	..	8	3	..	..	..	..	.....	65-100	Yes	..	Yes	....
St. Petersburg..	30,000	..	9	2	2	..	..	..	.....	82.50	Yes	10	Yes	No
Sarasota	2,500	1	1	1	10	..	..	..	.....	75	No	..	No	....
West Tampa...	15,000	2½	12	2	none	..	..	..	.....	90	Yes	20	No	No
Georgia:														
Americus	12,000	4.9	11	3	none	none	none	none	loss greatly decreased	60	No	..	No	No
Athens	25,000	7.2	16	3	..	..	..	..	good; decreased insurance rates	75	Yes	7	No	No
Atlanta 225,000		28	230	35	none	..	..	..	.....	75-90	No	..	No	No
Brunswick	17,000	14	8	2	..	..	..	..	.....	70	Yes	16	No	No
Carrollton	6,000	..	2	9	20	50	50	50	none	60-75	No	..	No	No
Douglas	6,000	..	..	..	14	100	100	100	.....	75[3]	....	..	....	....
Moultrie	7,000	1½	4	1	2	4[6]	6[6]	7[6]	good	50	Yes	10	No	No
Newman	7,500	1	6	2	4	..	..	..	good	45-55	Yes	10-20	No	No
Rome	20,000	6	21	5	none	none	none	6[9]	very best results	70-100	Yes	$[illegible]	No	No
Valdosta	15,000	6	7	1	none	..	..	..	better service	60	Yes	$5.00	No	No
Idaho:														
Boise	30,000	8	34	7	none	..	..	..	no effect	90	Yes	5-10	No	No
Pocatello	17,000	7	10	2	14	..	..	..	.....	100	Yes	10½	No	No
Illinois:														
Aurora	38,000	6.9	24	7	..	..	..	..	.....	85	Yes[7]	10	Yes	Yes
Belvidere	8,500	2	6	2	none	none	none	none	.....	75	No	..	No	No
Bloomington ...	30,000	4	33	2	..	..	..	..	.....	77	Yes	10	No	No
Cairo	18,000	3	17	4	..	..	..	..	better service	65	No	..	No	No
Cartersville	5,000	1½	1	6	8	..	..	..	.....	....	No	..	No	....
Champaign	17,555	4	10	3	..	..	..	20[6]	good	85	Yes	$10	No	Yes
Charleston	8,000	4	2	2	14	..	..	..	.....	....	..	..	No	....
Chester	3,500	..	..	4	21	all	all	all	.....	....	No	..	No	....
Chicago.....2,521,822		199.8	1,971	354	..	..	..	..	.....	$900 to $1,371	No	..	No	Yes
Chicago Heights	25,000	2½	16	1	none	50	50	75	change made recently	85-95	Yes	$10	Yes	No
Downers Grove..	3,500	1½	none	2	15	15[6]	15[6]	18[6]	.....	....	....	..	No	No
Du Quoin	7,500	1	..	..	10	..	..	..	.....	....	....	..	Yes	No
Dwight	2,800	1	..	6	16	..	..	..	.....	....	No	..	No	No
E. Moline	11,000	..	2	1	none	..	..	..	.....	85	....	..	Yes	No
E. St. Louis....	80,000	12.28	82	16	..	..	..	..	.....	90	Yes	$10	No	Yes
Elgin	28,000	9	27	6	none	..	..	..	.....	82.50-120	Yes	$6	No	Yes
Evanston	35,000	8	39	8	none	none	none	none	better service	82.50	Yes	$5	No	Yes
Granite City....	18,000	25	6	5	10	10[6]	15[6]	17[6]	.....	....	Yes	$10	No	No
Highland	3,700	..	..	..	25	..	..	..	.....	....	..	..	No	....
Jacksonville ...	16,000	4	11	2	..	..	..	..	.....	....	....	..	No	....
Joliet	50,000	4	26	10	..	..	..	..	.....	976.50	Yes	$5	No	Yes
Macomb	7,000	5	3	3	5	75	78	80	good	60-71	Yes	$10	No	No
Murphysboro ..	12,000	3½	3	1	..	..	..	..	good	70	Yes	$5	No	No
Marshall	2,500	1	..	3	18	..	..	..	.....	....	....	..	No	No
Normal	5,000	2	2	2	10	..	..	..	none	72.50	No	..	No	No
Pana	9,000	5	..	3	15	..	..	..	.....	60	Yes	5	No	No
Paris	10,000	4	5	1	none	..	..	..	.....	....	....	..	....	No
Paxton	3,000	4	none	4	10	10[6]	10[6]	10[6]	.....	....	....	..	....	....
Pekin	12,000	6½	5	2	5[1]	5[6]	5[6]	5[6]	better service	65	Yes	$5	Yes	No
Robinson	5,000	1	1	3	10	..	..	..	.....	80	Yes	$10	No	No
Waukegan	20,000	..	10	4	2	..	..	..	.....	....	Yes	12	Some	Yes
Witt	3,000	..	10	3	2	..	..	..	.....	....	....	..	No	....
Woodstock	5,000	4	none	3	18	..	..	..	.....	....	....	..	No	No
Indiana:														
Anderson	22,476	7	19	6	none	..	..	..	efficiency	75	No	..	Yes	No
Bloomfield	2,700	3 mls.	..	2	12	..	..	..	.....	....	No	..	No	....
Decatur	6,000	4	21	5	18	18[6]	18[6]	18[6]	.....	65	Yes	5	No	No
Elkhart	25,000	6	18	7	none	none	none	none	better service	85	Yes	15	No	No
Frankfort	10,000	..	7	1	none	..	..	..	.....	60	No	..	No	No
Garrett	5,000	1	none	5	22	24[6]	24[6]	24[6]	.....	....	....	..	No	No
Gary	60,000	31.5	57	13	none	..	..	..	.....	110	Yes	15	No	No
Jasper	2,500	1	..	..	15	..	..	..	.....	....	....	..	No	No
Kendallville ...	6,000	..	3	5	12	..	..	..	very good	60	No	..	No	No
Kokomo	17,000	8¾	21	5	..	..	..	..	.....	75-85	Yes	$5	No	Yes
La Fayette	22,000	6	26	6	..	..	..	..	.....	75-90	Yes	$6	No	Yes
La Porte	15,000	..	16	5	none	none	none	none	good	85	Yes	10	No	No
Lawrenceburg..	4,500	2¼	..	..	..	..	..	..	.....	....	....	..	No	No
Martinsville	5,000	3	2	2	10	all	all	all	change made May, 1917	60	....	..	No	No
Mt. Vernon.....	6,000	..	..	..	..	..	..	..	.....	....	....	..	....	....
Plymouth	4,500	..	1	..	22	22[6]	..	..	.....	75	....	..	....	....
Portland	6,000	4	3	2	10	..	..	..	.....	65	Yes	10	No	No
Richmond	30,000	4½	24	2	..	..	..	..	.....	80	Yes	5	No	No
Shelbyville	11,500	4	7	3	5	100	100	100	reduced fire losses	65	No	..	No	No
Sullivan	4,500	1¼	2	7	5	..	..	..	.....	60-75	No	..	Yes	No
Terre Haute....	75,000	10	79	3	none	..	..	..	.....	75-99	No	..	No	Yes
Vincennes	20,000	..	14	4	..	..	..	..	.....	810	No	..	Yes	No
Wabash	8,687	15	7	1	8	2[6]	4[6]	..	.....	70	Yes	5	No	No
Warsaw	....	..	2	3	90	75	75	75	.....	70	Yes	10	No	No
Washington ...	12,000	3	8	2	none	..	..	..	.....	62.50-72.50	Yes	$7.50	No	No
Whiting	10,000	13½	8	2	none	none	none	18[6]	better service	105	Yes	15	No	No

For footnotes, see page 459.

TABLE No. 1—THE CITY AND THE FORCE (Continued).

City and State	Population.	Area of city square miles.	No. of regular men.	No. of officers.	No. of volunteers.	Percentage of volunteers in 1915.	1913.	1911.	Effect of replacing volunteers by paid men?	Salary of regular men?	Has it been increased during past year?	What per cent?	Trouble in getting enough good men?	Is Dept. under civil service?
Iowa:														
Burlington	25,000	10	22	3	..	..	..	..	.....	65-80	Yes	6¾	No	Yes
Cedar Rapids	44,000	13	33	7	none	none	none	none	.....	84.16	Yes	5	No	Yes
Council Bluffs	32,000	16	24	3	..	..	..	..	.....	85	Yes	$5	Yes	Yes
Davenport	55,000	10½	55	12	none	none	none	none	better results	90	Yes	$7.50	No	Yes
Denison	....	4	..	..	92	..	..	..	.....	....	....	..	No	No
Fairfield	6,100	2¼	1	3	10	..	..	..	.....	75	No	..	No	No
Grinnell	6,000	2¼	2	4	50	all volunteers prior to January 1, 1914				90	Yes	30	No	No
Keokuk	17,000	5¼	11	2	none	none	none	none	.....	70	Yes	8	No	Yes
Le Mars	5,250	1	..	3	40	all are volunteers			.....	....	....	..	No	No
Marion	4,800	..	..	5	125	..	..	..	.....	....	....	..	..	....
Mason City	20,000	..	14	1	..	..	..	..	.....	65	....	8	No	Yes
Muscatine	17,000	6.7	14	3	none	98	99	100	reduction of losses	65-75	....	..	No	No
New Hampton	3,000	1½	..	7	90	..	..	..	.....	....	....	..	No	No
Oelwein	7,500	4	2	8	40	40[6]	35[6]	35[6]	.....	70	No	..	No	No
Sioux City	66,000	44	52	10	40	..	..	..	.....	70-91.50	Yes	8–10	Yes	Yes
Washington	....	1½	2	3	30	..	..	..	.....	70	Yes	20	No	No
Waterloo	22,693	13.3	20	4	none	none	none	none	.....	85	Yes	$5	....	....
Kansas:														
Cherrydale	5,000	4	3	..	..	..	..	..	better service	65-75	Yes	$10	No	No
Fredonia	3,500	2	..	..	18	..	..	..	.....	....	....	..	No	No
Helton	3,000	..	1	1	35	..	..	..	.....	65	Yes	10	....	....
Independence	12,500	10	8	2	none	..	..	..	.....	65	Yes	5	No	No
Kansas City	100,000	17½	115	4	none	..	..	..	.....	65-90	Yes	5	No	Yes
Mulberry	2,600	1	none	1	18	..	..	..	.....	....	....	..	No	No
Newton	10,000	..	5	2	2	..	..	..	.....	60-85	Yes	10	some	No
Olathe	3,700	4	1	2	9	..	..	..	.....	95	No	..	No	No
Ottawa	9,700	..	2	..	15	..	..	..	.....	65	No	..	Yes	No
Parsons	20,000	2	12	6	..	..	..	..	.....	85	Yes	10	Yes	Yes
Topeka	53,000	8½	77	16	..	..	..	..	.....	80	No	..	No	Yes
Kentucky:														
Cynthiana	5,000	..	1	..	36	36[6]	36[6]	36[6]	.....	60	No	..	No	No
Harrodsburg	4,000	4	..	..	15	100	80	75	.....	....	....	..	No	No
Henderson	13,000	4	13	3	none	none	none	none	very satisfactory	70	Yes	16⅔	No	Yes
Hopkinsville	13,000	..	4	2	8	..	..	..	.....	60	No	..	No	No
Lexington	42,000	7	50	7	none	..	..	..	.....	80	No	..	Yes	No
Richmond	6,000	..	13	2	..	..	..	..	.....	....	....	..	....	....
Russellville	4,000	1	12	3	..	..	..	..	.....	....	....	..	No	No
Louisiana:														
Jennings	5,000	2½	..	3	15	15[6]	..	..	.....	....	....	..	....	....
New Orleans	339,075	196¼	339	122	..	..	..	..	.....	75	No	..	No	Yes
Winnfield	4,000	3	..	..	30	..	..	..	.....	....	....	..	....	....
Maine:														
Augusta	14,000	..	4	1	72	..	..	..	.....	884	....	..	No	Yes
Biddeford	19,000	..	7	3	49[1]	49[6]	49[6]	49[6]	.....	....	....	..	No	No
Calais	7,500	..	23	5	none	..	..	..	.....	100	Yes	10	No	No
Camden	3,500	5	..	8	49	..	..	..	.....	....	....	..	No	No
Dexter	4,500	2	..	3	76	76[6]	76[6]	76[6]	.....	....	....	..	No	No
Hallowell	3,000	1	4	..	..	..	..	..	.....	....	....	..	No	No
Kennebunk	3,000	4	..	12	80	..	..	..	.....	....	....	..	No	No
Norway	....	1	..	15	60	..	..	..	.....	....	....	..	No	No
Portland	62,000	18	98	31	..	..	..	..	.....	....	....	..	No	No
Rumford	6,000	4	2	3	60	..	..	..	.....	75-95	No	..	No	No
Skowhegan	5,500	3	2	6	36	80	..	..	greater efficiency	80	Yes	2.5	No	No
Maryland:										975	No	..	No	No
Baltimore	600,000	33⅓	797	124	..	..	..	..	.....	900	No	..	....	Yes
Massachusetts:														
Adams	15,000	..	..	5	40	..	..	..	.....	....	....	..	....	....
Belmont	8,500	5	4	..	none	..	..	..	.....	95	Yes	10	No	Yes
Beverly	23,000	15	23	10	87	..	..	..	good	3.25 day	No	..	No	Yes
Brockton	63,000	21.6	55	20	..	..	..	..	.....	1,000-1,400	Yes	16⅔	Yes	Yes
Cambridge	120,000	6	97	27	none	..	..	..	.....	1.350	Yes	$50	No	Yes
Dedham	12,000	12	7	..	42	..	..	..	.....	1.100	Yes	10	No	Yes
Fitchburg	39,656	28.38	45	16	63[1]	..	..	..	more efficient work	3.10 to 3.28	Yes	7, 8, 9	at times	Yes
Foxboro	3,750	..	..	3	27	90	90	90	.....	....	....	..	No	No
Framingham	17,200	23	14	4	35[1]	..	..	85	less fire loss	3.00	Yes	25c	No	Yes
Gardner	17,000	23	6	10	58	100	100	100	less alarms	3.00	Yes	10	No	No
Gloucester	24,500	30	26	1	150	80	80	80	.....	1,100	Yes	10	No	Yes
Greenfield	15,000	3	3	5	52	..	..	..	.....	....	....	..	No	No
Haverhill	50,000	33	25	18	45[1]	..	..	..	.....	3.50-4.00	Yes	50-62½c	....	Yes
Hingham	5,500	7	3	10	100	100	100	100	good	1,000	Yes	12	No	No
Lawrence	100,000	7¼	70	20	none	..	..	..	.....	3.75	Yes	50c	No	Yes
Lowell	110,000	14.1	..	..	none	none	none	none	.....	3.30	Yes	10	No	Yes

Ludlow	7,000	..	..	..	50	.....	.....	.....	..	..	..	....	....	..	....	....
Lynn	102,000	11⅓	98	29	none	none	none	none	better efficiency			100	Yes	$8.33	No	Yes
Malden	53,000	30	54	10	none	..	..	..	better service			100	Yes	10	No	Yes
Marblehead	7,500	5	6	5	43	..	..	..	.....			3.00	No	..	No	No
Middleboro	8,500	..	3	7	..	..	..	..	.....			....	....	..	....	No
Milton	9,000	13	14	2	30	..	..	..	.....			110	Yes	10	....	yes
New Bedford	120,000	19⅓	156	34	none	..	..	..	.....			100	Yes	15	....	Yes
No. Andover	6,500	12	3	3	30	same	same	same	.....			78-82	Yes	5	No	No
No. Brookfield	2,917	..	none	none	32	100	100	100	.....			....	....	..	No	No
No. Easton	4,000	3	2	5	20	80	100	100	very satisfactory			1,000	No	..	No	No
Orange	5,782	..	..	3	43	..	..	..	.....			....	....	..	No	No
Pea body	18,000	10	80	5	..	..	..	..	.....			$3 per day $150 per yr.	No	..	No	Yes
Quincy	42,600	16	36	2	none	..	..	..	good			100	Yes	10	No	Yes
Reading	6,900	7	5	..	28	..	100	100	.....			73-88	Yes	10	....	No
Revere	30,000	25	36	6	..	..	..	..	good			108	Yes	15	No	Yes
Salem	42,500	8	45	12	35[1]	..	..	..	.....			100	Yes	7	No	Yes
Somerville	90,000	42.2	77	14	14	same	same	33	more efficiency			1,325	Yes	10.5	Yes	Yes
Spencer	6,000	..	..	3	all	..	..	..	.....			....	....	..	....	No
Taunton	36,000	50	36	8	45[1]	..	..	..	.....			....	Yes	10	Yes	Yes
Walpole	6,000	10	..	4	50[1]	..	..	..	.....			....	Yes	25	No	No
Waltham	31,700	13.5	23	1	56	71	71	76	.....			98	Yes	20	No	Yes
Ware	10,000	..	2	4	45	..	..	..	.....			78-91	Yes	12-16	No	No
Watertown	21,000	4.3	16	2	15[1]	19[6]	21[6]	31[6]	reduced losses			100	No	..	No	No
Wellesley	9,500	16	7	3	24	88	95	100	.....			100	Yes	10	No	No
Westford	3,000	3	..	10	36	..	..	..	....			....	....	..	No	No
Winthrop	12,288	2⅓	8	11	38	83	80	80	good			91	No	..	No	Yes
Worcester	145,986	36½	210	53	..	..	..	..	.....			....	Yes	$9.66	No	Yes
Michigan:																
Albion	8,000	4	4	1	10	15[6]	17[6]	17[6]	good			80	No	..	No	No
Alpena	12,706	14	13	3	..	80	..	..	very good			65	Yes	10	No	No
Ann Arbor	20,000	..	18	4	..	..	..	..	.....			84.70	Yes	20	Yes	No
Battle Creek	35,000	6	40	10	3	3[1]	3[1]	3[1]	good			97.50	Yes	15	No	No
Belding	5,000	4	11	1	none	..	..	..	.....			....	No	..	No	No
Cadillac	10,500	4	4	1	20	..	..	..	.....			70	....	..	....	No
Detroit	900,000	77.7	771	129	none	none	none	none	.....			1,200-1,400	Yes	12	Yes	Yes
East Jordan	3,000	..	..	3	18	..	..	..	.....			....	....	..	No	No
Grand Haven	7,500	..	2	1	9	..	..	..	.....			70	No	..	No	No
Greenville	5,050	1	11	2	none	none	none	none	.....			....	No	..	No	No
Hillsdale	5,000	5	3	4	14	..	..	..	.....			75	Yes	20	No	No
Holland	12,000	..	..	..	28	..	..	..	.....			75	Yes	15	No	No
Iron Mountain	9,500	3	8	1	none	..	..	..	.....			85	Yes	20	No	....
Lapeer	4,500	1	2	1	6	14[1]	14[1]	14[1]	.....			70-75	No	..	No	....
Manistee	12,381	2.8	10	2	..	..	..	..	.....			70	Yes	$10	No	Yes
Marquette	13,000	..	5	6	24	..	..	..	.....			80-85	Yes	14.6	No	....
Pontiac	28,000	9	16	3	..	..	..	50	better service			71-83	Yes	$15	Yes	No
Wyandotte	10,200	..	10	4	8	..	..	..	good			100	Yes	..	No	No
Minnesota:																
Albert Lea	8,000	..	2	..	20	same	same	..	.....			80	Yes	15	No	No
Anoka	5,000	..	3	2	24	..	..	..	.....			65	No	..	No	No
Bemidji	8,000	4	..	2	45	100	100	100	.....			80	Yes	$5	No	No
Chisholm	10,000	..	18	4	none	..	..	..	.....			110	Yes	10	No	No
Cloquet	7,031	3	7	1	..	..	..	..	good			80	Yes	7	Yes	No
Detroit	4,000	4	..	..	21	25[6]	25[6]	25[6]	.....			....	....	..	No	No
Duluth	80,000	60	140	22	..	..	..	..	.....			87.50	Yes[7]	..	No	Yes
E. Grand Forks	3,200	..	2	..	10	10[6]	10[6]	10[6]	.....			60-75	No	..	No	No
Fairmont	4,000	1½	..	..	40	40[6]	38[6]	38[6]	.....			....	....	..	No	....
Hastings	4,000	..	..	6	20	..	..	..	.....			....	....	..	....	....
Little Falls	6,800	4	1	..	240	..	..	..	.....			....	....	..	....	No
Minneapolis	400,000	53.3	438	85	..	..	..	..	.....			92-101	Yes	$5	No	Yes
New Ulm	7,000	8	..	..	48	48[6]	48[6]	48[6]	no change			....	....	..	No	No
Pipestone	3,500	9	..	13	47	same	same	same	.....			....	....	..	No	No
St. Cloud	15,000	..	8	3	1	..	..	..	very good			70	Yes	..	No	No
St. Paul	280,000	54.4	303	18	none	none	..	..	.....			77-100	Yes	5	since the war	Yes
Stillwater	10,500	4	7	3	2	same	same	same	.....			75	Yes	10	No	Yes
Thief River Falls	6,000	½	..	..	16	10[6]	..	..	.....			....	No	..	No	No
Two Harbors	5,000	3	..	4	20	..	..	..	.....			....	....	..	....	No
Virginia	18,000	9	16	6	none	none	none	none	excellent			110	Yes	20	No	partly
Willmar	5,000	..	..	..	50	..	..	..	.....			....	....	..	....	....
Winona	18,583	9	30	10	none	..	..	..	.....			....	....	..	No	Yes
Mississippi:																
Jackson	30,000	6	32	7	4[8]	..	..	..	.....			65	No	..	No	No
Vicksburg	25,000	6	30	2	none	none	none	..	.....			70-80	No	..	No	No
Missouri:																
Cameron	4,000	1	none	5	25	..	..	..	.....			....	....	..	No	No
Carthage	11,000	4	6	2	none	none	..	..	.....			65	Yes	$5	No	No
Chillicothe	12,000	6	2	2	6	..	..	..	.....			60	No	..	No	No
Hannibal	18,341	9	11	2	none	none	none	none	very good			75	Yes	$5	No	No

For footnotes, see page 459.

TABLE No. 1—THE CITY AND THE FORCE (Continued).

City and State	Population.	Area of city square miles.	No. of regular men.	No. of officers.	No. of volunteers.	Percentage of volunteers in 1915.	1913.	1911.	Effect of replacing volunteers by paid men?	Salary of regular men?	Has it been increased during past year?	What per cent?	Trouble in getting enough good men?	Is Dept. under civil service?
Missouri (Continued):														
Kansas City	350,000	60	270	86	..	..	..	..	.....	85	No	..	Yes	Yes
Maryville	6,500	5	7	2	..	..	..	..	.....	70	No	..	No	No
Moberly	14,000	..	4	..	none	..	..	..	.....	60	No	..	Yes	No
Monett	5,000	1½	..	1	7	7[9]	14[6]	14[6]	.....	....	....	..	No	No
Poplar Bluff	12,000	4	2	4	8	10[6]	10[6]	10[6]	.....	70	No	..	No	No
St. Charles	10,000	3	4	2	12	75	88	88	loss been reduced	60-65	No	..	No	No
St. Louis	905,692	61.4	838	16	none	none	none	none	.....	105	No	..	No	Yes
Springfield	55,000	8	41	7	none	..	..	..	.....	83.33	Yes	8⅓-10	Yes	Yes
Washington	5,500	4	..	..	120	all	all	all	.....	....	....	..	....	....
Webster Groves	10,000	4	7	4	3	all	all	all	reduced insurance; better protection	60-70	Yes	$5-$10	No	No
Nebraska:														
Nebraska City	6,000	8	2	..	50	25	20	50	none	60-75	No	..	No	No
Norfolk	9,600	9	2	4	100	100	100	75	none	70	Yes	10	No	No
Nevada:														
Reno	15,000	..	20	5	none	none	none	none	.....	100[2]	Yes	5	No	No
New Hampshire:														
Concord	21,497	63	13	..	200[1]	..	..	..	.....	1,000-1,050	Yes	15-19	No	No
Laconia	14,000	..	8	5	68	..	..	..	more efficient service	1,000	Yes	10	No	No
Nashua	26,005	32	28	6	62[1]	..	..	..	more effciency	1,050	No	..	No	No
New Jersey:														
Flemington	3,200	5	..	..	100	100	100	100	.....	....	....	..	....	....
Freehold	4,000	..	..	..	135	100	100	100	.....	....	....	..	No	No
Glen Ridge	4,000	3	3	3	40	same	..	..	.....	1,110	Yes	12	Yes	No
Hackensack	17,000	4	15	4	30[1]	..	..	..	less fire loss	90	Yes	15	No	No
Haddonfield	5,300	..	..	4	50	100	100	100	.....	....	....	..	No	No
Hammonton	6,500	10	..	6	34	100	100	100	.....	....	....	..	....	....
Irvington	2,300	..	9	3	25	..	..	..	.....	75-100	....	..	....	No
Jersey City	300,000	19.2	252	52	none	..	..	..	.....	1,300	No	..	No	Yes
Kenworthy	1,100	10	..	4	26	some	some	none	.....	....	....	..	No	No
Lambertville	5,000	1	..	3	180	all	all	all	.....	....	none	..	No	No
Millville	15,000	..	..	..	42	100	100	100	.....	....	....	..	No	No
Pitman	3,000	..	..	..	207	..	..	..	.....	....	....	..	....	....
Plainfield	20,550	6	32	6	31	..	..	..	better in every way	3,514.08[9]	some	..	Yes	No
Roosevelt	12,000	9	..	7	50	100	100	100	good	100	Yes	10	No	No
Woodstown	1,500	..	..	..	31	..	..	..	.....	....	....	..	....	....
New Mexico:														
Raton	5,700	2½	2	..	12[1]	all	all	all	none	85	Yes	4½	No	No
Roswell	8,000	..	7	3	5	50	75	100	90% more efficiency	60[2]	No	..	Yes	No
New York:														
Albany	120,000	19.4	126	38	..	..	..	..	.....	900-1,100	Yes	$100	No	Yes
Amityville	2,800	6	..	..	110	..	..	..	.....	....	....	..	....	....
Auburn	37,000	9	47	8	none	..	..	..	.....	1,000	No	..	No	Yes
Batavia	14,000	..	10	1	none	100	..	..	saving of 66%	60-70	No	..	No	Yes
Binghamton	53,970	10	80	5	..	..	..	..	.....	780-1,140	No	..	Yes	Yes
Brockport	3,750	1½	..	18	125	100	100	100	.....	....	....	..	No	No
Canastota	3,500	2	none	3	75	100	100	100	.....	....	....	..	....	No
Cohoes	25,000	4½	21	5	156	some	some	some	.....	70-85	Yes	15	No	Yes
Corning	15,000	..	10	4	135	..	..	..	improvement in service	960	expect $10 increase	..	Yes	Yes
Elmira Heights	4,500	5	..	..	50	100	100	100	.....	....	....	..	Yes	No
Frankfort	4,200	..	..	..	80	..	..	..	.....	....	....	..	....	....
Freeport	8,500	5	..	17	275	all	all	all	.....	....	....	..	....	....
Fulton	12,000	..	8	3	16[1]	..	..	..	.....	....	....	..	....	No
Geneva	14,000	4	4	13	225	some	some	some	more efficient	66	No	..	No	Yes
Gloversville	22,000	5	12	3	15[1]	..	..	..	.....	70	No	..	No	Yes
Goshen	3,500	4	..	..	120	..	..	..	.....	80	Yes	$10	No	Yes
Herkimer	11,000	1½	2	3	137	..	..	..	.....	....	....	..	....	....
Jamestown	38,780	10	42	8	none	..	..	..	.....	70-75	Yes	$5	No	No
Johnson City	8,000	2	4	3	90	30[6]	50[6]	60[6]	good	85	Yes	$5	No	Yes
Liberty	2,800	1	none	12	114	100	100	100	.....	85-90	Yes	8	No	No
Little Falls	14,000	..	5	..	20[1]	..	..	..	.....	....	....	..	No	No
Lowville	3,800	1.3	..	3	58	all	all	all	.....	70-80	Yes	$10	....	Yes
Mamaroneck	7,000	17	..	14	250	70	70	70	.....	....	....	..	No	No
Mechanicsville	8,500	..	..	..	190	..	..	..	.....	....	....	..	No	No
Middletown	17,000	..	7	10	301	some	some	some	.....	....	....	..	....	....
New Rochelle	36,000	..	28	1	316	..	..	..	.....	$2.50	Yes	10	No	No
New York	4,766,883	314.7	5,134	800	931	..	..	..	.....	65-95	Yes	$15	No	Yes
Oswego	25,000	7.8	18	5	8[1]	some	some	some	.....	1,000-1,450	Yes	3½	No	Yes
Patchogue	5,000	2	none	4	250	100	100	100	.....	80	Yes	14.3	No	Yes
Peekskill	16,000	..	6	18	400	..	..	..	.....	....	....	..	No	No
Plattsburg	10,000	..	6	2	100	..	..	..	good	78-91	No	..	No	Yes
Rome	25,000	4	23	6	100	100	100	100	fires extinguished quicker	65	Yes	12	Yes	Yes
Rye	5,500	12	2	15	170	..	..	..	.....	70-80	Yes	$5	Yes	Yes
										75-100	Yes	20	No	No

Scotia	5,000	2	2	9	80	65	67	72	good	70 per month	No	..	No	partially
Silver Creek	3,300	5	..	..	90	..	..	..	.....	....	....	..	No	No
Solvay	5,000	3	..	12	90	..	..	..	.....	....	....	..	No	No
Syracuse	100,000	19	216	..	none	..	..	..	.....	100	Yes	$15	No	Yes
Tonawanda	9,143	..	7	1	100	150[8]	150[8]	150[8]	good	75-100	Yes	10	Yes	Yes
Utica	88,150	15	96	26	..	..	..	..	.....	1,[illegible]2.60	No	..	No	Yes
Warsaw	3,600	4	2	..	110	..	..	..	.....	75	Yes	20	No	No
Watkins	3,000	3	..	..	150	all	all	all	.....	60	....	..	....	....
Waverly	....	..	2	4	2	4	150	..	.....	....	....	..	No	No
Westfield	4,500	4½	..	5	76	some	some	some	.....	....	....	..	No	No
White Plains	22,000	9	6	24[10]	200	..	..	..	better service	90	No	..	No	Yes
Whitesboro	3,000	..	..	..	75	..	..	..	.....	....	....	..	....	....
Yonkers	95,000	21	92	29	600	..	..	..	.....	850-1,300	Yes	$100	No	Yes
North Carolina:														
Asheville	30,000	13	7	..	40	16	16	16	.....	85	Yes	20	No	modified
Durham	26,060	3.87	20	4	..	..	..	..	best of service	$60 & $65	Yes	$1/2	No	No
Kinston	12,000	2	3	4	56	90	90	90	.....	60	Yes	10	No	No
Mooresville	5,000	1	..	6	25	..	..	..	.....	....	....	..	No	No
Raleigh	30,000	4	23	5	none	none	none	80	good	60-70	Yes	5	No	Yes
North Dakota:														
Carrington	1,500	1	..	..	40	all	..	..	.....	....	....	..	....	....
Jamestown	6,000	2	1	1	52	52[6]	52[6]	60[6]	.....	75	No	..	No	No
Valley City	6,000	6	..	5	40	50[6]	50[6]	50[6]	.....	....	....	..	....	....
Williston	5,246	4	..	2	17	some	some	..	.....	....	....	..	No	No
Ohio:														
Akron	155,000	25	92	25	none	none	none	none	efficiency and discipline better	85[2]	Yes	17	Not much	Yes
Alliance	23,000	4½	17	5	..	..	..	..	.....	10[illegible]30	Yes	25	No	Yes
Ashland	6,795	..	3	..	50	..	..	..	.....	70	No	..	No	Yes
Bellaire	15,000	..	4	4	20	..	..	..	.....	90	Yes	$20	Yes	Yes
Bellefontaine	10,000	3	7	1	8[1]	..	..	..	.....	70	....	..	No	Yes
Bryan	4,612	4	3	4	14	14[6]	14[6]	14[6]	.....	91.50	Yes	$1[illegible]0	No	No
Bucyrus	10,000	4	4	1	14[1]	90	90	..	very good	80	Yes	15	Yes	Yes
Carrollton	2,250	1½	..	5	30	all	all	all	.....	....	....	..	....	No
Cleveland	750,000	55	396	227	none	..	..	..	.....	112	Yes	10	Yes	Yes
Columbus	240,000	22.4	180	95	..	..	..	..	.....	100	Yes	10	Yes	Yes
Conneaut	12,000	4	11	3	none	none	..	..	good	85	Yes	..	....	Yes
Crestline	4,000	..	..	..	21	..	..	..	.....	....	....	..	No	No
Dennison	4,200	1	none	1	..	..	..	..	.....	....	....	..	No	Yes
East Cleveland	25,000	3	22	5	none	..	..	..	efficiency	1[illegible]3.50	No	..	No	Yes
East Palestine	6,000	2	..	..	50	some	some	some	.....	....	....	..	No	No
Elyria	25,000	7	17	7	none	none	20	20	more efficiency	100	Yes	10	Yes	Yes
Findlay	15,500	10	14	3	none	none	..	..	.....	75	No	..	Yes	Yes
Greenfield	5,000	2	3	3	10	some	some	some	.....	55	Yes	10	No	No
Jackson	6,000	2½	5	3	2	..	..	..	.....	83	No	..	No	Yes
Jefferson	1,500	4	none	..	25	..	..	..	.....	....	....	..	No	Yes
Kenton	8,000	..	4	3	11	..	..	..	fair	75	No	..	Yes	Yes
Lakewood	40,000	6½	22	4	none	none	50	75	more efficiency	112	Yes	10	Yes	Yes
Lebanon	4,300	..	16	4	none	..	..	..	good	....	Yes	$5	No	Yes
Lima	42,000	..	25	10	..	..	..	..	.....	85	Yes	10	Yes	Yes
Loraine	40,000	10½	31	4	115	some	some	some	very good	1,276	Yes	15	Yes	Yes
Marietta	18,000	6	12	2	none	..	..	..	.....	70-80	No	..	Yes	Yes
Martins Ferry	13,000	1	..	5	70	58	60	..	.....	....	....	..	....	....
Middletown	24,000	..	9	3	..	..	..	..	.....	90	Yes	$10	Yes	Yes
Mt. Vernon	10,000	2	6	1	none	..	..	..	.....	70	Yes	10	No	Yes
N. Philadelphia	10,000	6	4	2	20	some	some	some	.....	90	Yes	50	No	Yes
Oberlin	5,000	4	1	1	25	all	all	all	.....	85	....	..	No	No
Orrville	5,000	..	..	6	25	75	..	..	.....	....	....	..	....	....
Portsmouth	27,000	3	25	2	none	..	..	..	Reduced fire loss 45%	75	Yes[21]	25	Yes	Yes
Salem	10,000	2	3	..	100	..	..	..	.....	....	....	..	....	....
Springfield	65,000	13	40	12	none	none	none	none	.....	90	Yes	12½	No	Yes
Toledo	272,665	31.7	234	8	..	..	..	..	.....	100	Yes	$10	No	Yes
Warren	25,000	4	10	4	..	..	..	..	.....	105	Yes	20	Yes	Yes
Weston	950	1	..	4	15	100	100	100	.....	....	....	..	No	No
Youngstown	120,000	25	69	23	none	none	none	none	.....	110	Yes	$10	No	Yes
Oklahoma:														
Ada	8,500	..	3	4	12	..	..	..	.....	60-80	Yes	5	Yes	No
Bartlesville	15,000	..	5	3	2	40	40	40	.....	75-85	Yes	$5	Yes	Yes
Chickasha	16,000	2½	10	4	none	none	none	none	.....	75	Yes	10	No	No
Hugo	8,000	8	3	3	5	..	..	..	.....	65-75	No	..	No	No
Miami	7,500	2½	5	2	12	50	50	..	good	65-75	Yes	$10-$15	Yes	No
Sapulpa	12,000	1½	11	2	none	..	..	..	.....	85	Yes	10	No	No
Oregon:														
Astoria	18,000	5	11	1	18[1]	..	..	..	.....	100	Yes	$15	No	No
Baker	10,000	..	4	2	20	20[6]	20[6]	20[6]	good effect on department	85	Yes	$10	No	No
Corvallis	7,000	..	2	15	112	..	..	..	.....	75	Yes	..	....	....
Marshfield	5,000	6	2	6	35	some	some	some	good	90-120	Yes	10	No	No
Roseburg	6,000	4	1	3	12	all	all	all	excellent	65	Not yet	10	Yes	No

For footnotes, see page 459.

TABLE No. 1—THE CITY AND THE FORCE (Continued).

City and State	Population.	Area of city square miles.	No. of regular men.	No. of officers.	No. of volunteers.	Percentage of volunteers in 1915.	1913.	1911.	Effect of replacing volunteers by paid men?	Salary of regular men?	Has it been increased during past year?	What per cent?	Trouble in getting enough good men?	Is Dept. under civil service?
Pennsylvania:														
Altoona	52,127	3.6	58	11	14[1]	..	..	..	.....	66-91	Yes	10	Yes	Yes
Bangor	5,369	3	..	..	110	..	..	..	.....	....	....	..	....	....
Beaver	3,500	..	1	3	35	..	..	..	.....	.....	.....	No	No	No
Beaver Falls	15,000	..	4	5	38	..	..	..	reduction in loss	80-100	Yes	$10	Yes	No
Bellwood	3,000	½	..	..	45	..	..	..	.....	....	....	..	....	....
Blairsville	6,000	1½	..	4	50	35%	25%	25%	.....	....	....	..	....	....
Bristol	12,000	..	..	..	500	..	..	..	.....	....	....	..	....	....
Brookville	4,000	2	..	5	50	same	same	same	.....	.....	....	..	....	....
Carlisle	10,303	4	5	..	800	..	..	..	.....	700	Yes	10	No	No
Clearfield	8,500	..	..	..	300	..	..	..	.....	.....	....	..	....	....
Connellsville	15,000	..	7	2	42	50%	49%	60%	reduces fire loss	80-100	Yes	15	No	Yes
Duquesne	1,900	2	6	..	..	..	..	..	.....	114	Yes	33	No	In 1918
Duryea	9,000	..	..	..	50	40%	40%	40%	.....	....	....	..	....	....
Easton	30,530	3½	26	3	13[1]	..	..	..	.....	80	Yes	$10	No	Yes
Franklin	13,000	9	3	2	8	13	13	..	good	85	Yes	$5	Yes	Yes
Galeton	4,000	8	..	..	58	..	..	..	.....	....	....	..	....	....
Gallitzin	3,500	..	..	2	40	..	..	..	.....	....	....	..	....	....
Girardville	5,247	1	..	3	400	..	..	..	.....	.....	....	..	....	....
Jeannette	10,000	1	4	1	..	..	..	..	.....	90	Yes	$12.50	No	Yes
Jersey Shore	7,000	3½	..	7	32	85	80	70	.....	....	....	..	....	....
Lansford	12,000	1	..	5	275	..	..	..	.....	....	....	..	....	....
Latrobe	10,000	1	..	..	125	..	..	..	.....	....	....	..	....	....
Lehighton	7,000	1	..	..	300	250%	200%	200%	.....	....	....	..	....	....
Mt Union	8,000	2½	..	5	39	..	..	..	.....	....	....	..	....	....
Norristown	30,000	6	..	..	1,500	..	..	..	.....	.....	....	..	....	....
Oil City	20,000	4.2	..	2	12[1]	..	..	..	very good	70-80	Yes	$5	Yes	Yes
Philadelphia	1,549,008	129.6	906	174	none	none	none	none	.....	$1,000-$1,200	Yes	10	No	Yes
Pittsburgh	580,000	40.7	906	151	none	none	none	none	.....	100	No	..	No	Yes
Plymouth	17,000	1.1	..	9	125	all	all	all	.....	.....	....	..	....	....
Pottstown	16,000	5	3	3	..	..	..	..	.....	65	Yes	10	No	No
Quakertown	5,500	12	..	10	50	..	..	..	.....	....	....	..	....	....
Reading	100,000	65	..	3	5,800	..	..	..	.....	.....	....	..	....	....
Scottdale	7,000	1	4	7	96	85%	81%	..	.....	85-125	Yes	25	No	No
South Fork	6,000	..	..	10	75	..	..	..	.....	....	....	..	....	....
Sunbury	13,770	3	7	1	1,100	..	..	..	.....	....	....	..	....	....
Turtle Creek	9,500	..	..	4	42	36%	36%	36%	.....	....	....	..	....	....
Tyrone	8,000	..	..	30	300	..	..	..	.....	.....	....	..	....	....
Uniontown	19,500	..	7	2	140	..	..	..	.....	75	Yes	10	No	Yes
Warrens	14,000	3	8	3	185	..	..	..	.....	70-80	....	..	Yes	No
West Berwick	13,000	20	..	..	200	..	..	..	.....	....	....	..	....	....
Wilmerding	6,000	..	..	..	36	..	..	..	.....	....	....	..	....	Yes
Rhode Island:														
Central Falls	23,708	1.9	16	6	..	..	..	..	.....	1,000	Yes	$160	No	No
Woonsocket	42,000	8.8	50	19	..	..	..	..	.....	93	Yes	12½	No	No
South Carolina:														
Aiken	4,500	4	..	..	12	..	..	..	.....	.....	....	..	....	....
Charleston	60,000	4½	85	7	..	..	..	..	.....	75-85	No	..	No	No
Darlington	5,000	4	..	4	2	..	..	..	.....	75	In 1914	..	....	....
South Dakota:														
Aberdeen	13,000	4	12	..	..	..	..	..	good	930-1,400	Yes	..	No	....
Lead	9,000	2	12	2	none	none	all	all	loss ⅔ less	90	Yes	5	No	No
Madison	4,500	2	1	3	54	..	..	..	.....	70	No	..	No	No
Watertown	9,000	2½	6	2	15	same	same	same	reduced insurance	75-115	Yes	5-15	No	No
Tennessee:														
Chattanooga	75,000	7	73	12	..	..	..	..	.....	90-110	Yes	$10	Yes	No
Clarksville	12,000	12	3	2	15	80	80	80	.....	60-65	In 1915	..	No	No
Cleveland	8,500	..	3	2	7[18]	all	all	all	good	50	No	..	No	No
Greenville	6,000	..	..	2	16	..	..	..	.....	....	....	..	....	....
Humboldt	5,000	1	..	..	8	..	..	..	.....	.....	....	..	....	....
Jackson	20,000	4½	10	2	none	none	none	none	.....	77 50-90	No	..	No	No
Johnson City	15,000	..	3	1	10	85	70	..	.....	60-90	Yes	10	No	No
Knoxville	90,000	26	86	23	..	..	..	..	.....	75	Yes	$5	No	Yes
Nashville	117,057	18.2	94	34	..	..	..	..	.....	90	No	..	No	No
Paris	5,000	1	1	4	10	all	all	..	.....	....	....	..	....	....
Texas:														
Amarillo	19,000	8½	10	4	18	25%	25%	7%	better service	65-90	Yes	7	Yes	No
Austin	35,000	16.5	33	1	none	100	100	100	great improvement	72.50-80	No	..	No	No
Bonham	7,500	7	4	2	35	30%	30%	30%	.....	60	Yes	$5	No	No
Brenham	5,000	1	2	3	50	100	100	100	.....	75	....	..	....	....
Dallas	130,000	20	170	5	none	none	none	..	.....	1,050	Yes	..	No	....
Denison	20,000	8	10	2	..	..	..	..	.....	70-75	....	..	No	No
El Paso	61,902	9.1	63	17	none	..	..	..	.....	85-95	Yes	13	....	Yes
Georgetown	4,000	..	..	4	45	all	all	..	.....	....	....	..	No	No

Gainesville	8,000	6	4	1	100	..	..	..	.....	75	Yes	10	No	No
Houston Hghts.	11,000	4	10	3	none	none	none	none	.....	65-100	Twice	5	No	No
Laredo	25,000	..	5	4	115	..	..	..	.....	30-60	Yes	10	No	....
New Braunsfels.	....	6	3	10	60	no record			.....	60-75	No	..	No	No
Palestine	12,500	5	8	2	none	none	none	none	.....	75	Yes	10	....	No
Port Arthur	20,000	..	12	3	35	..	..	..	.....	75	Yes	16	No	No
San Marcos	4,500	3	2	3	50	75	75	75	.....	55	No	..	No	....
Sequin	5,000	..	2	10	118	..	..	..	.....	80	No	..	No	No
Victoria	8,000	2	9	5	200	..	..	..	.....	60	No	..	No	No
Utah:														
Brigham	5,500	..	none	4	21	..	..	..	.....	....	....	..	....	....
Logan	11,000	12	6	2	3	..	..	..	.....	75	....	..	....	....
Ogden	32,000	16½	24	6	none	..	..	..	.....	95	Yes	5	Yes	No
Salt Lake City	125,000	54	68	15	none	..	..	..	.....	85-105	Yes	5	No	No
Vermont:														
Bellows Falls	8,000	4	6	4	36	..	..	..	.....	78	Yes	2	No	No
Bennington	9,000	..	..	..	100	..	..	..	.....	....	....	..	....	....
St. Johnsbury	8,000	4	4	13	61	..	..	..	good	76	Yes	10	No	No
Virginia:														
Bedford	....	2¼	..	5	20	..	..	..	.....	....	....	..	....	....
Charlotteville	12,000	5	3	1	35	same	same	same	.....	....	....	..	No	Yes
Covington	7,000	..	..	..	35	..	..	..	.....	....	....	..	No	No
Harrisonburg	5,500	4	none	7	235	..	..	..	.....	....	....	..	....	....
Lynchburg	35,000	4	59	5	none	none	none	none	more efficient	65-80	Bonus given them		Yes	....
Newport News	41,000	3	15	9	175	..	..	..	.....	85-95	Yes	$10	At times	No
Roanoke	47,500	7	58	18	none	none	none	none	satisfaction	69.50-77.50	Yes	$7.50	Yes	No
Staunton	15,000	..	12	4	20	..	..	..	.....	....	No	..	No	No
Washington:														
Bellingham	35,000	23	13	2	none	none	none	none	good	75	No	..	No	Yes
Chehalis	5,000	4	2	3	10	..	..	..	.....	75	....	..	....	....
Ellensburg	4,000	..	4	2	20	..	..	..	better service	70-80	No	..	No	No
Olympia	9,000	9	6	2	20	..	..	..	.....	80	Yes	5	No	No
Port Townsend	5,000	4	2	1	25	..	..	..	.....	100	Yes	10	No	No
Puyallup	6,000	2	..	4	20	..	..	..	.....	....	....	..	....	....
Seattle	350,000	56	603	103	..	..	..	..	.....	95-110	Yes	$10	No	Yes
Tacoma	120,000	43	106	4	none	..	..	..	.....	85-95	Yes	$10	Yes	Yes
Walla Walla	25,000	4.8	22	3	..	..	..	..	.....	75-150	Yes	15	No	No
West Virginia:														
Elkins	7,000	4	2	4	18	..	..	..	.....	65	Yes	15	No	No
Fairmont	18,500	5	11	3	32	33	50	50	good	85	Yes	20	Yes	No
Keyser	6,000	..	..	..	30	..	..	..	.....	....	....	..	No	Yes
Martinsburg	12,000	3½	6	10	195	..	..	..	.....	60-70	No	..	....	No
Princeton	8,000	..	..	4	18	..	..	..	.....	....	....	..	....	....
Sistersville	....	..	..	3	125	..	..	..	.....	....	....	..	....	....
Wheeling	45,000	3¾	51	12	none	..	..	..	.....	95	Yes	10	Yes	No
Wisconsin:														
Antigo	8,000	1½	8	2	12	15	5	1	.....	67.50	Yes	$7.50	No	Yes
Appleton	18,000	6½	20	6	none	..	..	..	.....	80-85	Yes	15	No	Yes
Ashland	15,000	8½	14	3	none	..	..	..	.....	62.50-78.50	Yes	15	No	Yes
Berlin	5,000	..	..	3	12	..	..	..	.....	....	....	..	No	Yes
Fond du Lac	22,000	6	16	9	..	..	..	..	.....	70	will be	10	No	Yes
Ft. Atkinson	4,500	..	none	none	65	..	..	..	.....	....	....	..	....	....
Grand Rapids	7,000	12	..	..	24	..	..	..	.....	....	....	..	....	....
Hudson	3,500	..	..	..	15	..	..	..	.....	....	....	..	....	....
Jefferson	....	4	..	8	65	..	..	..	.....	....	....	..	....	....
LaCrosse	33,000	10½	45	6	..	..	..	..	.....	75-80	Yes	5	Yes	Yes
Manitowoc	15,000	..	18	7	none	..	..	..	saving to city	68-83	Yes	$10	Yes	Yes
Merrill	9,000	6	9	4	..	..	..	..	good	60	Yes	$5	No	Yes
Milwaukee	450,000	25.8	570 total		..	..	..	..	.....	80-102.50	Yes	3-18	not yet	Yes
Oshkosh	33,062	8½	39	9	none	..	..	..	.....	70	Yes	$5	No	Yes
Plymouth	3,500	1	..	..	250	..	..	..	.....	....	....	..	....	....
Portage	6,000	..	..	4	28	..	..	..	.....	....	....	..	....	....
Rhinelander	7,000	2½	8	3	none	none	none	none	greater efficiency	70-80	Yes	25	No	Yes
Shawano	3,500	2¼	..	..	15	..	..	..	.....	....	....	..	....	....
Stoughton	5,000	1½	..	..	33	..	..	..	.....	....	....	..	....	....
Superior	47,000	47	75	..	none	..	..	..	.....	....	Yes	5	....	Yes
Waupun	3,500	..	..	4	24	..	..	..	.....	....	....	..	No	Yes
West Bend	3,000	1	..	..	60	..	..	..	.....	....	....	..	....	....
Wyoming:														
Evanston	4,000	..	..	..	65	..	..	..	.....	....	....	..	....	....
Canada:														
Westmount	18,000	1½	35	8					paid department since 1892	850-1,050	twice	5 each	Yes	Yes

[1]Call men; [2]and higher; [3]are fully paid; [4]substitutes; [5]for truck driver; [6]number enrolled; [7]to take effect January, 1918; [8]substitutes. [9]total monthly pay. [10]25 are volunteers; [11]increase has been asked for but not yet granted; [12]these are young business men who have fire alarm in their homes and answer all calls at $2.50 for each alarm.

TABLE No. 2—FIRE PREVENTION WORK.

City and State	Is fire prevention work organized?	What power has bureau to enforce orders?	Do regular firemen do inspecting?	How many inspectors in the bureau?	How often each year is each building inspected?	Has prevention bureau reduced fire losses?
Alabama:						
Brewton	No		No	None		
Gadsden	o		No	1	12	Yes.
Huntsville	Yes.		Yes.		24	
Arizona:						
Bisbee	No		Yes.	All firemen		
Douglas			Yes.		4	
Nogales	No		Yes. chief	None		
Phoenix	No	Power of arrest	Yes.	6	2	Yes.
Arkansas:						
El Dorado	No					
Fort Smith			Yes.		4	
Little Rock			Yes.	Once[1]	Once[1]	Yes.
Prescott	Yes.		Yes.		4	Yes.
Russellville	No		No	None	None	No.
California:						
Alameda	No		Yes.			
Berkeley	No		Yes.			Yes.
Emeryville	No		Yes.		3	Yes.
Modesto	No		Yes			
Monrovia	No		Chief only	2	Monthly	Yes.
Oakland	Yes.	City Ordinance	Yes.	28	2	Yes.
Palo Alto	Yes	City ordinance	Yes	3	Frequently	Yes
Pasadena			Yes.		3 or 4	
Petaluma			Yes.			
Pomona	No		Yes.			
Richmond	No	City Ordinance	Yes.		Monthly	Yes.
San Leandro	No		No	None	Once	No.
Santa Ana	No		Yes.		12	
Santa Barbara	No		No			
Santa Monica			Yes.	2	6	Yes.
Stockton	No		Yes.	All captains	3 times	Yes.
Colorado:						
Boulder			Yes.		8	
Colorado Springs	Yes.	City Ordinance	Yes.	2	Once[2]	Yes.
Fort Collins	No	None	No	None	2	No.
Grand Junction	No		Yes.		2	Yes.
Idaho Springs		Arrest	Yes.	2	3	Yes.
Longmont	No		Yes.	Firemen	Monthly	Yes.
Trinidad	Yes.	Arrest, fine and imprisonment.	Yes.	6	Monthly	Yes.
Connecticut:						
Bridgeport	Yes.	Legal	Yes.	4	12	Yes.
Danbury	No		Yes.		6	
Hartford	No	City Ordinance	Yes.			Yes.
New Britain	No		Yes.		4	
New Haven	Yes.	City and State laws	Yes.		Monthly[3]	Yes.
Norwich	Yes.		Yes.		Several	Yes.
Torrington	Yes.	Legal	Yes.	2	1 or 2	Yes.
Waterbury	No		Captains cover districts			Yes.
District of Columbia:						
Washington	Yes.	Law and regulations	Yes.	5		Yes.
Florida:						
Lakeland	No	Left to chief	No	1	12	Yes.
Quincy	Yes.	Ordinances	Yes.	1	1	Yes.
St. Augustine	No		Yes.			
St. Petersburg	No		Yes.		6 to 12	Think so.
Sarasota	Yes.	Arrest and fine	Yes.	2	2	Yes.
West Tampa	No		Yes.	None		
Georgia:						
Americus	Yes.	City Ordinance	Yes.	4	2	Yes.
Athens	No		Yes.		4	Yes.
Atlanta	No			1		
Brunswick			Yes.		Twice	
Carrollton	No		Chief		Weekly	
Moultrie			Yes.		2	
Newman	No	Police	Yes.	2	2 to 5	Yes.
Rome	Yes.	Full power	Yes.	3	12 to 20	Yes.
Valdosta	No		Yes.			
Idaho:						
Boise	Yes.	Legal	Yes.	32	Weekly	Yes.
Pocatello	No		Yes.		4	
Illinois						
Aurora			Yes.		2	
Belvidere	No		Yes.	5	2 or 3	
Bloomington	Yes.	State law	Yes.	2	4	Yes.
Cairo	Yes.	State and City laws	Yes.	None	2	Yes.
Cartersville	No		No		2	Yes.
Champaign	Yes.	City Ordinance	Yes.		5 or more	Just started.
Charleston	No	State and City laws				Yes.
Chester	Yes.	State laws		1		
Chicago	Yes	City ordinance	Yes	35	2	Yes
Chicago Heights	No		Occasionally			
Downers Grove	No		Chief			
East Moline			No		Twice	
East St. Louis	No		Yes.		Once	
Evanston	Yes.	City Ordinance	Yes.	All men	4	Yes.
Granite City	No		No	None	Once	No.
Jacksonville	Yes.		Yes.	2	2	
Joliet			Yes.		Every 30 days	
Macomb	No		Yes.		Once	
Murphysboro	No	Chief and firemen	Yes.		12	Yes.
Normal	No		Some			Fire loss has decreased
Pana	No	Chief and firemen be deputizes.	No		Once or more often	Yes.
Paris			Fire chief			
Paxton	No		No	None	4	
Pekin	No		Yes.		Twice	Yes.

For footnotes, see page 464.

TABLE No. 2—FIRE PREVENTION WORK (Continued).

City and State	Is fire prevention work organized?	What power has bureau to enforce orders?	Do regular firemen do inspecting?	How many inspectors in the bureau?	How often each year is each building inspected?	Has prevention bureau reduced fire losses?
Indiana:						
Anderson	No		Yes		2	No.
Decatur		Chief and two paid men	Yes	3	2	Yes.
Elkhart	No	Fire Department inspects	Yes		4	Yes.
Frankfort		State Fire Marshal law	Chief only		3	Yes.
Garrett	No		Chief	Chief only		
Gary	Yes	Receive orders from Fire Marshal	Yes		4	
Kendallville			Yes		2	Yes.
Kokomo	No		Yes		4	
Lafayette	Fire Dept.	State Fire Marshal laws	Yes	2	4	Yes.
La Porte	No		Yes		4	
Lawrenceburg	No			3 councilmen		
Martinsville					1	
Plymouth	No		Yes	1	3	
Richmond	No		Yes		4	Yes.
Shelbyville	No				4	Yes.
Terre Haute	Yes	Police power by ordinance	Yes	11	Monthly	Yes.
Vincennes			Yes		2	
Wabash			No		2	
Warsaw	Yes	State law	Volunteers	All firemen	Varies	Yes.
Washington	No		Yes		2	
Whiting	Yes	Ordinance	Yes	3	2	Yes.
Iowa:						
Burlington			Yes		2	Yes.
Cedar Rapids	Yes	City and State laws	Yes	6	Continuously	Yes.
Council Bluffs	No		Yes		4	
Davenport	Yes	City Ordinance	Yes	2	3 or 4	Yes.
Grinnell			Yes		2	Yes.
Keokuk	No		No	None		
Marion				3	4	
Mason City	No		No	1	24	
Muscatine	No		Only chief		1	Think so.
Oelwein	Yes	Ordinance	Yes	1	4	Yes.
Sioux City			Yes	8	12	
Washington			Yes	1	2	
Waterloo	Yes	Ordinance	Yes	1		Yes.
Kansas:						
Cherryvale			Yes		2	
Fredonia	Yes	City Ordinance	Yes	6	2	Yes.
Independence	No		Yes		8	
Kansas City	No		Yes	2	Weekly	Yes.
Mulberry	No	Arrest	Chief	1	2	Yes.
Newton	No		Yes		2-8	Yes.
Olathe	Yes		Yes	2	12	Yes.
Parsons	No		Chief		4	
Topeka	Yes	City and State laws	Yes	7	12	Yes.
Kentucky:						
Cynthiana		Chief and State Marshal make inspections				Yes.
Harrodsburg	No		Chief	1	8	Yes.
Henderson	Yes	City and State laws	Yes	3	3-5	Yes.
Lexington	No		Yes		2	
Russellville			Yes		2-3	Yes.
Louisiana:						
Jennings				14		
New Orleans	Yes	City ordinance	Yes	1	12	Yes
Winnfield				5		Yes.
Maine:						
Augusta					12	
Biddeford	No	Chief has power	No		1	
Calais	Yes		Inspector	1	2	Think so.
Camden	No		Yes	2	2	Yes.
Dexter	No		Yes	3	2	Yes.
Norway	Yes	State laws	Chief	1		Have few fires.
Portland	No		Yes		As necessary	
Rumford	Yes		No	2	2	Yes.
Maryland:						
Baltimore	Yes	Fire prevention law	Yes	1	4	Yes
Massachusetts:						
Beverly	No		Yes	4	Weekly	Yes.
Brockton	No		Captains		Several	
Cambridge	No		Yes	None	12	Yes.
Fitchburg	No		Yes		Weekly	
Framingham	No		Yes		4 or more	Yes.
Gardner	No		Chief		12	Yes.
Gloucester	No		Yes		24	Yes.
Greenwich				1	3 or 4	Yes
Haverhill	No		Yes		12	
Hingham			Yes		2	
Lawrence	Yes	Ordinances	Yes	10	4	No.
Lowell	No		Yes		24	
Lynn	No	Legal	Yes	All officers	12	Yes.
Malden	Yes	Laws and ordinances	Yes		4	Very much.
New Bedford	Yes		Yes	4		Yes.
North Brookfield	No		No	None	4 or 6	
Quincy	Commission	Legal power	Yes	3	4	Think so.
Reading		Under Metropolitan District	Yes		12	
Revere					12	
Salem	Yes	City Ordinance	Yes	12	25	Yes.
Somerville	Yes	Legal	Yes		2	Apparently.
Walpole			Yes		1	
Waltham	No		Yes	4	12	Yes.
Watertown	Yes	Under Metropolitan District	Yes	4	2-4-6	Yes.
Wellesley	Yes	By law	Yes	7	12	Yes.
Westford	No					
Worcester	Yes	Legal	Officers	53	24	

For footnotes, see page 464.

TABLE No. 2—FIRE PREVENTION WORK (Continued).

City and State	Is fire prevention work organized?	What power has bureau to enforce orders?	Do regular firemen do inspecting?	How many inspectors in the bureau?	How often each year is each building inspected?	Has prevention bureau reduced fire losses?
Michigan:						
Albion	No		Yes		2	Yes.
Alpena			Yes		12	
Battle Creek	No		Yes		4	Yes.
Cadillac			Yes	1	3	Yes.
Detroit	Yes	City ordinance	Yes	3	4	Some
East Jordan			Yes		2	Yes.
Hillsdale		State and city laws	Yes	3	3	Yes.
Lapeer	No	State law	Yes	1	4	
Manistee			Yes		6	
Wyandotte	Yes	Full	Chief	1	3	
Minnesota:						
Albert Lea	No				12	
Anoka	Yes		Yes	1	2	Yes.
Chisholm	Yes	Full	Yes		4	Yes.
Detroit	No				1	
Duluth	No		Yes		2	
E. Grand Forks	No				12	
Fairmont				1	2	Yes.
Minneapolis	Yes	Legal	Yes	4	24	Yes.
New Ulm	No		Yes	2	2	Yes.
Pipestone	No		Yes		1	
St. Cloud			Yes		4	Yes.
St. Paul	Yes	Arrest	Yes	2	4	Yes.
Stillwater	Yes	Arrest	Yes	2	4	Think so.
Thief River Falls		City and State laws	No	1	1	Yes.
Virginia	Yes	Full power	Yes	2	4	Yes.
Willmar					3	
Winona	Yes	City Ordinance	Yes	10	12	Yes.
Mississippi:						
Jackson			Yes	4	12	Yes.
Vicksburg	Yes	Full power	Yes	2	4	Yes.
Missouri:						
Cameron	No				1	Think so.
Carthage	No		Partially		1	
Hannibal	No		Yes		2	Yes.
Kansas City	Yes	Arrest	Yes	4	8	No.
Maryville	No		Yes		2	
Moberly	No		No	None	1	No.
St. Charles	No		Chief		1	
St. Louis	No	None	Yes	Each Co.	2	
Springfield	No		Yes		12	Yes.
Washington	No		No	No		
Webster Groves	Yes	City Ordinance	Yes	2	2	Yes.
Nebraska:						
Nebraska City	No		Yes	3	2	Yes.
Norfolk	Some	Full	Yes		2	Don't know.
Nevada:						
Reno	No		Yes		2	Yes.
New Hampshire:						
Laconia	Yes	Full power	Yes	5	3	Yes.
Nashua		City Ordinance	Yes		2	Yes.
New Jersey:						
Glen Ridge	Yes	By insurance companies only	No	Chief	2	Yes.
Hackensack	Yes		Yes	Chief		Yes.
Haddonfield	Yes	Stringent building regulations.	Yes	1	1	
Irvington	Yes	System just started				
Jersey City	No		Yes		12	
Lambertville	Yes	Full power	Yes	11	1	Yes.
Plainfield	No		Yes		No reg. time	
Roosevelt	No		Yes		1	
New Mexico:						
Raton	No	City Ordinances	Yes	1	4	Yes.
Roswell	Yes	Ordinance	Yes	2	1	Yes.
New York:						
Albany	No	Ordinance	Each company covers own district		2	Yes.
Auburn	No		Yes		6	
Batavia					1	
Binghamton	Yes	Fire and building code	Yes	7		Yes.
Brockport		Chief and assistants make semi-annual inspections				
Canastota	Yes	Full	Yes	9	3 or 4	Yes.
Coboes	No		Yes		3 or more	Yes.
Corning		Ordinance		Chief	2-4	Yes
Freeport	No		Chief			Yes.
Fulton	Yes	Complain to police	Yes		4 or more	Yes.
Gloversville	No		Yes		4	
Jamestown	No		Yes		2	
Johnson City	Yes	Ordinance	Yes	30		Yes.
Liberty	Warden's	Orders backed by village	No	9	No regular time	Yes
Mamaroneck	No		Yes		2	
Mechanicsville	No	Ordinance	No	None		
New Rochelle		Full power	Chief	1	2	Yes.
New York	Yes	State and City laws	Yes	140	12	Yes.[3]
Patchogue	No		Chief		1	Yes.
Plattsburg	No		Yes		4	Yes.
Rome		City charter	Yes	4	4	Yes.
Scotia	Yes	Full	Yes	5	2	Yes
Silver Creek	No		No	1	1	
Syracuse	No		Yes	20	2	Yes.
Utica	No		Yes		4	Yes.
Warsaw					1	
Waverly	No		Yes	3	2	
Westfield	No		No	None	None	No.
White Plains			Yes		12	
Yonkers		Legal	Yes	None	2	Some.

For footnotes, see page 464.

TABLE No. 2—FIRE PREVENTION WORK (Continued).

City and State	Is fire prevention work organized?	What power has bureau to enforce orders?	Do regular firemen do inspecting?	How many inspectors in the bureau?	How often each year is each building inspected?	Has prevention bureau reduced fire losses?
North Carolina:						
Asheville	Yes	Arrest and condemnation	Yes	3	4	Yes.
Durham			Yes		2[5]	Yes.
Kinston	Yes	State insurance commission	Yes	2	4	Yes.
Raleigh	Yes	State laws	Yes	5	12	Yes.
North Dakota:						
Carrington	No		Yes		1	Probably.
Jamestown	Yes		No		1	Yes.
Valley City			Yes	25	4	Fewer alarms.
Ohio:						
Akron	Yes	Power to arrest	Yes	11		Yes.
Alliance	No		Yes		4	
Bellefontaine			Yes		2	
Bryan	Yes	Full	Yes	2	3	Yes.
Carrollton		Only inspection is by State Fire Marshal. Full legal power				
Cleveland	Yes	Fire Marshal	Yes	15	No definite	...ment work
Columbus	Yes	City and State law	Yes	4	52	Yes.
Conneaut	Yes	Ordinance	Yes	5	12	Yes.
Crestline	No		Chief	1	2	Yes.
E. Cleveland	Yes	City Ordinance	Yes	3	12	About 20 p. c.
E. Palestine	No		No	2	4	
Elyria	No		Yes		4	Yes.
Findlay	No		Yes		2	No.
Kenton	Yes		No	2	2	Yes.
Lakewood	Yes	City Ordinance	Yes	22	12	Yes.
Lima	No		Yes		2	Yes
Lorain	No		Yes		2	
Middletown	Yes		Yes	2	3	Yes.
Mt. Vernon	No		Yes	1	12	Yes.
New Philadelphia	No		Yes		3-4	Yes.
Portsmouth	Yes	City Council	Yes	3	4	Yes.
Springfield	Yes	State and City laws		2	6	
Toledo	No		Yes		6	
Warren	No		Yes	4	6	Yes.
Youngstown	Yes	State law	Yes	3	12	Yes.
Oklahoma:						
Ada		Chief does all inspection work			4	Yes.
Bartlesville	No		Yes		12	
Chickasha	Yes	City Ordinance	Yes	4	2 to 104	Yes.
Sapulpa	No		Yes		4	
Oregon:						
Astoria	Yes	City Ordinance	Yes		3 or 4	Think so.
Baker	No	Ordinances			12	Yes
Corvallis					[illegible]	
Pennsylvania:						
Altoona	No	Arrest and fine	Yes	18	2-4	Yes.
Beaver Falls	No		Yes		6	
Bellwood	No		No	1	When reported.	Yes.
Connellsville	Yes	Same power as Mayor	Yes	6	12	Yes.
Duquesne	No		Yes		2	
Easton	No		Yes	2	12	Yes.
Franklin	Yes	As fire marshal	Yes			Yes
Jeannette	Yes	City Ordinance	Yes	4	12	Yes.
Jersey Shore	No	State Fire Marshal	No	None	Several	Yes.
Latrobe	No		Yes	1	1	
Oil City		City and State laws	Chief			Yes.
Philadelphia		Fire Marshal's Div., Bureau of Police		24		
Pittsburgh	Yes	Bldg. Insp. Dept	Yes	1	2	Yes
Reading	Yes	Chief and State Fire Marshal	No	None	When neces'ry.	Yes.
Uniontown	No		Yes		2	
Wilmerding	Yes		No			Yes.
Rhode Island:						
Woonsocket			Yes		7	
South Carolina:						
Aiken				1	1-4	
Charleston	Yes	City and State laws	Yes	6	1-12	Yes.
Darlington	No		Yes	All firemen ...	1-4	Yes.
South Dakota:						
Aberdeen			Yes		3	
Lead	No		Yes	11	1	Some.
Madison	Yes		No	4	2	Yes.
Watertown	Yes	As fire warden	Yes	1	2	Yes.
Tennessee:						
Chattanooga			Yes			
Clarksville	No		Yes	2	4	
Cleveland		State Fire Marshal and Chief work together				Considerably.
Humboldt	No		No	No	1	Yes.
Jackson	Yes	Arrest and prosecute	Yes	10	12	Yes.
Johnson City	Yes	Police power	Yes	1	12	Yes.
Knoxville			Yes	1		Yes.
Nashville	No		Yes		2	Yes.
Texas:						
Amarillo	No		Yes	1	12	Yes
Austin	No		Yes	1	2	Yes.
Dallas		Fire Marshal	Yes	2		Yes.
El Paso	No	As fire marshal	Yes		12	Yes
Gainesville	No		No			
Georgetown	No		Yes	4	12	
Houston Heights	Yes	Ordinance	Yes	10	12	Yes.
New Braunfels	No		Chief and Marshal		4	Yes.
Palestine	Yes	Legal	No	1	12	Yes.
San Marcos		City Fire Marshal has power.	Two	2	12	Yes.
Seguin	Yes		One		12	
Victoria	Yes	State and City laws	Yes	7	2	

For footnotes, see page 464.

City and State	Is fire prevention work organized?	What power has bureau to enforce orders?	Do regular firemen do inspecting?	How many inspectors in the bureau?	How often each year is each building inspected?	Has prevention bureau reduced fire losses?
Utah:						
Brigham	No		Yes	1	2	Yes.
Logan			Yes		8	
Ogden	Yes		Yes	1	12	Yes.
Salt Lake City	No		Yes	1		
Vermont:						
St. Johnsbury	Yes	None	Yes	7	2	Think so.
Virginia:						
Bedford	Yes	Have power but fail to use it.	No	3	4	Don't know.
Harrisonburg	No		None	None		
Newport News	No		Yes	2	5-6	Yes.
Roanoke	Yes	State and City laws	No	1		Yes.
Staunton	Yes	Fine	Yes	2	4	Yes.
Washington:						
Bellingham	No		Yes		12	Yes.
Olympia	No				4	
Port Townsend	Yes		Yes	3	2	
Puyallup	No		Yes	3	2	Yes
Seattle	Yes	Warrants and arrests	Yes	8	2	Don't know.
Walla Walla	No		Yes		12	Yes.
West Virginia:						
Elkins	No		Chief	1	4	Yes.
Fairmont	No		Yes		2	
Keyser	Yes	Full			1	
Martinsburg	Yes		Yes	5	2-4	Yes.
Wheeling	Yes	City Ordinance	Yes	9	3	Yes.
Wisconsin:						
Antigo	Yes	City ordinance	Yes	2	4	Yes
Appleton	Yes	Full	Yes	2	4	Yes.
Ashland	No		Yes		4	
Berlin		State and City laws	Yes	1	4	Yes.
Fond du Lac			Yes	All officers	24	Yes.
Ft. Atkinson	No		No	1	4	Yes.
Grand Rapids			Yes		4-2	
Hudson	No				4	
Jefferson	No				4	Yes.
La Crosse	No		Yes		2-4	Yes.
Manitowoc			Yes	3	4	Yes.
Merrill	State		Yes		4	Yes.
Milwaukee	Yes	Building Inspector or City Attorney has power	Yes	11	2-4	Yes.
Oshkosh	Yes	State law	Yes		4	Yes.
Portage	Yes	State law	Chief	6	6	Yes.
Rhinelander			Yes		2 or 4	Yes
Shawana	No		No		6	
Stoughton			Yes		2-4	
Superior	Yes	City Ordinance	Yes	3		Yes.
Waupum			Chief		4-6	
West Bend	No		Yes	3	4	
Canada:						
Westmount		Regular inspection	Yes		2	

[1] Also when Chief thinks it is necessary or advisable; [2] buildings in fire limits, once each week; [3] oftener when necessary; [4] often as possible; [5] reduction of 1912-1916 over 1907-1911 of $7,909,582; [6] have a fire prevention commission; [7] from $6,500 to $270; [8] 12 times a year in fire district.

FIRE DEPARTMENT NOTES.

Chief Hopkins, of Charleston, Ill., writes that he would urge the importance of universal adoption of the standard coupling so that any city when called upon by neighboring cities would be able to render some assistance.

Chief Geo. L. Koerner of Portsmouth, Ohio, states that there is an organization of the towns in that vicinity, members of which furnish assistance to each other and all the apparatus in which towns is provided with uniform couplings.

In Normal, Ill., population 5,000, the force is all volunteer except two officers, a chief and assistant chief, who are hired as police officers but have charge of the fire department.

Chief J. R. Gibbs, of Winnfield, La., writes suggesting the desirability that dealers in motor apparatus should extend more credit to small towns in order that such towns might obtain fire apparatus. In that state bond issues cannot be voted legally for purchasing fire apparatus, and the dealers require a cash payment of at least $3,000 to $5,000, which sum it is difficult for small towns to raise at one time for this purpose.

In Laconia, N. H., the firemen are instructed in the location of boxes and hydrants until they are able to answer such questions as the following: "Where is box No. 25 located and what is the size of the water main in that street? How many feet of hose would be required to reach a certain factory on such a street from the nearest hydrant? Where is the sprinkler shut off in this factory? Where is the valve for shutting off this water main?" Chief A. W. Spring says that the firemen can answer all such questions satisfactorily.

In Martinsburg, W. Va., population 12,000, chief Martin Quinn states that all of the new men are required to visit and inspect buildings to learn their location and conditions, and to learn the location of every business house, church, school, factory, fire hydrant and street in the city.

Oberlin, Ohio, population 5,000. Chief C. R. Graham reports that there are plumbers, carpenters, electricians, gas inspectors and draymen in the department, which is entirely volunteer, and these keep up the inspection of the properties in the city and report to the state inspectors.

An explanation given by Charles S. Hafer, chief of Little Rock, Ark., concerning the miles run by their motor apparatus per gallon of gasoline may apply to other cities as well. Chief Hafer says that their department was completely motorized this year, some of the pieces of apparatus having been only a few months in service, and considerable gasoline has been consumed in breaking in the men in handling them, driving them around when not in actual service, etc., as a result of which figures of mileage and gasoline consumed would not be fair to the machine.

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FIRE DEPARTMENT TABLES IN THIS ISSUE.

During the past month the Municipal Journal has obtained, through the kindness of the chiefs of about 600 fire departments, a great amount of information concerning the equipment of their departments as to apparatus, the fire alarm system in service, the amount and nature of fire prevention work being done, the fire fighting force and the matter of pensions and benefits provided for such force. The information so collected is so voluminous that it seems impracticable to give it all in one issue and we are accordingly presenting in this number only that referring to the composition, salary, etc. of the force of the department, and the fire prevention work being done. The other information will be given in later issues of Municipal Journal.

Together with these data on fire prevention, we are also publishing in this issue two papers dealing with the same subject, one describing the work of the Fire Marshal's Department of Ohio (one of the oldest departments of this kind in the country and also one of the most effective), and another describing the work of the Fire Prevention Bureau of New York City. There are given also descriptions of the work being done by most of the state fire marshal departments of the country, compiled from information furnished us directly by the several fire marshals.

These articles and data give a very complete survey of the fire prevention work being done by cities and states throughout the country. This seems especially appropriate at this time, when conservation of all the country's resources, of which conservation fire prevention is a most important factor, is so vitally necessary to our prosecution of the war. Several of the fire marshals, especially the Ohio State Marshal, have emphasized the special importance and difficulty of fire prevention work at this time owing to the addition to the ordinary dangers of that due to the activities of agents and sympathizers of Germany, who have been and probably will be increasingly active in the destruction of all industries connected with the furnishing of war munitions and of food.

FIRE PREVENTION AND PATRIOTISM.

The appeal of patriotism is being urged upon citizens in every walk of life and in connection with almost every kind of activity and function. The kitchen, the store and factory, public work and private pleasure, all are embraced in the efforts which we are urged to make to "do our bit" in helping the country at this critical period.

One of the most important of these, and yet one which has not received from the press so great a degree of attention as the others, is that of fire prevention. It is of no avail that the farmers double their crops if the surplus is to be destroyed in transit or in warehouses. Neither our own army nor that of our allies can profit by the enormous amount of munitions being turned out if these are to be destroyed before they leave this country; and the capital and labor invested in the production of such munitions is worse than wasted if such factories are to be destroyed by enemies in this country and the laborers therein rendered temporarily inactive.

A large share in preventing such destruction is necessarily borne by the secret service department, but this department should be cooperated with to the fullest extent by all public officials who can effectively render patriotic service in this way. These include the state and city fire marshals and bureaus of fire prevention, and also the police force of the city, which can and should render valuable aid in guarding property against incendiarism and in apprehending the offenders. It therefore seems most desirable that the fire departments seek the most intimate relationship and cooperation with the police departments.

In addition to the dangers of incendiarism, the fact that new buildings are being used for warehouses, some of which buildings were perhaps not constructed for this purpose, and that buildings that were so constructed are being used to the limit of their capacity, makes more necessary than ever the enforcement by fire prevention bureaus of regulations calculated to eliminate such dangers as spontaneous combustion or accidental fires, which dangers have always existed but are now more threatening than ever owing to the conditions referred to.

Fire prevention work by city department officials is now one of the most effective directions in which they can exert their patriotism for the benefit of the country.

THE TIME TO PUT OUT A FIRE.

If there were a smallpox epidemic in your city and the health department were to buy a fine new automobile hearse with silver and white silk fittings and were to invite the citizens to inspect it, would you be proud of the progressiveness of your city and of the hearse?

But there are frequent fires in your city and when your department buys a new blazing red triple combination with nickel and brass fittings the delighted citizens drop in at the fire house and pat the chief on the back.

There is no difference between these two cases—only that in matters of public health we have recognized that the first duty of the city is to prevent disease, but in the matter of public safety we have not realized that the first duty of the city is to prevent fires, accidents and crimes. In the field of fire protection we are still where we were about a hundred years ago in public health—when people believed that smallpox was an act of God. When we

have a typhoid epidemic now we do not hold public prayer meetings—we boil the water, pasteurize the milk and isolate the patients. Not only that—we want to know why the water was allowed to become polluted and why the food regulations were not enforced. We have become educated to demand prevention. When we have a big fire we should demand to know why the building was of tinder construction, why there is no stringent building law being vigorously enforced, why the citizens and children have not been educated out of carelessness and why gross over-insurance is allowed to encourage arson.

The average annual fire loss during the past ten years in this country and Canada has been $230,000,000. Is it because our firemen are incompetent, untrained or cowardly? There is no more splendid body of fire-fighters in the world than those of American cities. The truth is that fire-fighting has reached the limit of its effectiveness. We are fighting fire as well as we can. Let us take the burden off the firemen—it is now up to the city council and the state legislature. The only way to reduce fire losses is through prevention.

Let us recognize that every piece of fire apparatus is a splendid confession of civic crime and every foot of hose an admission of failure. Some are necessary, but it is in our power to need them less. We cannot legislate and educate fires out of existence, but we can perhaps reduce them by half.

The time to put out a fire is before it starts.

STATE FIRE MARSHAL LAWS.

Synopsis of That of Pennsylvania, Which Contains Most of the Provisions Common to a Majority of the State Laws.

The laws of most of the states creating and defining the powers of fire marshal are similar in many respects and, in fact, it is apparent that certain paragraphs in many of the later laws have been taken bodily from the earlier ones. This is of course true of other classes of statutes and it is perfectly proper that provisions that have proved satisfactory in one state should be adopted in others. The Pennsylvania act dealing with the department of state fire marshal seems to contain almost all of the provisions to be found in most of the other state laws, and an extensive abstract of that law is given herewith:

The act creating the position of state fire marshal of Pennsylvania was passed by the legislature in 1911 and supplemented in 1913. This act provides for the appointment by the governor of a state fire marshal for a term of four years at a salary of $5,000 and expenses. He is required to give a bond of $10,000 for the faithful performance of his duties. The marshal appoints a chief assistant fire marshal at $4,000 and expenses, and a first and second deputy, each at $3,000 and expenses. The marshal may also appoint as many stenographers at $1,200 each as may be necessary, and clerks and assistants at $3 a day. In addition to these, the chiefs of all fire departments throughout the state, and, in any incorporated district where there is no fire department, the burgess or president of the board of supervisors, are by virtue of their office assistants to the marshal, and subject to the duties and obligations of the act and the directions of the marshal. The marshal may also appoint individual citizens as assistants. The assistants, who do not receive a salary, receive fifty cents for each separate fire reported to the marshal, fifteen cents for each mile traveled to the fire, and, at the discretion of the marshal, not to exceed $3 a day for the time spent in the investigation.

The assistants are required to investigate the cause, origin and circumstances of every fire in the state and so far as possible determine whether it was incendiary, the investigation to be begun immediately after the fire by the assistant in whose territory it occurred. If there is suspicion of incendiarism, the state fire marshal is to be notified immediately. In any case, within ten days after its occurrence each fire shall be reported to the marshal on a form prescribed by him.

Also, every fire insurance association doing business in the state must report annually to the marshal, on blanks furnished by him, the total amount of policies that they have out, and send to him the date and location of each fire in property insured by it, the amount for which it had insured the property, probable loss and supposed cause of the fire; such reports to be sent by registered mail on or before the 10th of each month, to cover all fires of the previous month. If incendiary origin is suspected, information shall be sent at once. Any company violating these provisions is liable to a penalty of $250, and forfeiture of its license if it is a foreign company.

If the marshal or his deputies or assistants are requested, or think it desirable to do so, they are directed to inspect buildings and premises within their jurisdiction, and if they are found to be for any reason especially liable to fire and endangering other property, an order shall be given directing them to be removed or repaired; and if any combustible or explosive material or inflammable conditions are found, they must be remedied. Owners receiving such orders may appeal from the marshal to the court of common pleas of the county. Any owner failing to comply with such an order and who makes no appeal within five days is liable to a penalty of $25 for each day's neglect after the twentieth day; which penalty may be recovered as a debt collectable by law in any court of jurisdiction.

The marshal, his deputies and assistants have power to summon witnesses and require them to produce books and other documents, and to administer oaths. No such witness can be excused from testifying on the ground that his evidence would tend to convict him of a crime or subject him to a penalty or forfeiture, but he cannot be prosecuted for any matter concerning which he has testified. If the marshal or his assistants believe that a crime has been committed, the evidence is to be turned over to the district attorney, who institutes criminal proceedings. Any witness who refuses to obey the summons of the marshal or to produce documents can be punished for contempt of court by application to any court within whose jurisdiction such contempt took place.

The state fire marshal is required to keep on file all reports and records of all kinds relating to his office, and these shall be made public, except that testimony of witnesses may be withheld at his discretion. He is to prepare blank forms for furnishing information; also prepare, in consultation with the superintendent of public instruction, text books for use in public and private schools with regard to the dangers of fire and the prevention of fire waste; and the superintendent of instruction and principals of the schools shall see that such books are used systematically for giving such instruction. The schools are also required to hold fire drills at least once a month.

The marshal is required to make an annual report outlining the work done by his office during the previous year and making such recommendations as he thinks proper.

The WEEK'S NEWS

Embargo Holds Up Road Work—State Highway Developments in Georgia and Oregon—Reactionary Health Legislation in Ohio—New York City Sells Surplus of New Water Supply—Indiana Public Service Commission's Year's Work—Serious Fires in Charleston, W. Va.; Paterson, N. J.; Atlantic City, N. J.; Baltimore, Md.; Tulsa, Okla.; Cleveland, O.; Philadelphia, Pa., and Boston, Mass.—Two-Platoon System in Buffalo and Tacoma—San Francisco's Lodging House Fire Traps—New Motor Apparatus in Newark, Syracuse, Terre Haute and Natchez.

ROADS AND PAVEMENTS

Road Work Held Up by Priority Ruling.

Washington, D. C.—The Council of National Defense, through the Priority Board, has ordered that the following classes of materials may not be shipped in open-top freight cars, except flat cars, after Nov. 1: "1. Materials and supplies, other than coal, for the construction, maintenance, or repair of public or private highways, roadways, streets or sidewalks. 2. Materials and supplies other than coal, for the construction, maintenance, or repair of theatres or other buildings or structures to be used for amusement purposes. 3. Materials and supplies, other than coal, for the manufacture of pleasure vehicles, or furniture or musical instruments. 4. Passenger vehicles, furniture and musical instruments, which articles the undersigned finds are not essential to the national defense security." The order will affect practically all road work being completed at the present time, as contractors have not been prepared for such a move. Sand, slag, gravel and stone will be impossible to obtain over the railroads, and only some brick, cement and asphalt will be obtainable when shipped on gondola cars. No hearings were held before the order was issued and highway engineers and contracts are complaining vigorously of this treatment. Action was taken because of acute coal shortage in many parts of the country and there is no indication as to when the order will be lifted.

Stricter Control of Street Openings.

Montclair, N. J.—Determined that the permanently paved streets in the town shall not be damaged by being disturbed by contractors and public utility corporations, the Montclair board of commissioners has voted to increase the deposit required for a permit to open streets, which is now $10, to at least $50. In addition a written guarantee will be required that the street shall be properly relaid. The bond required at present from contractors will be continued. The town has been obliged recently to do considerable work on trenches in streets improperly filled in by contractors. In its road improvement program the town is endeavoring by every means possible to see that water, sewer and gas connections are made before permanent pavements are laid. Commissioner John Picken suggested that the commission go further and demand more durable pipe in street connections. In his opinion the life of the galvanized iron pipe used at present is not more than ten years, while the pavement to be put down will exceed the life of the pipe by five or more years.

Georgia Road Projects Approved.

Atlanta, Ga.—At a meeting of the state highway commission judge T. E. Patterson, chairman, made the announcement that all the 1917 Georgia projects have been approved by the United States government and the Georgia apportionment of money out of the federal road aid fund is now available. Of the six projects approved by the federal department as this year's program, the most important project is that contemplating a first-class highway between Atlanta and Macon. Work on all the projects, however, will be started and carried on at the same time. For some time there was a question of whether the government would compute the value of the convict labor which the state will use on the road on a per diem basis for each man used, or whether it would be on a basis of maintenance cost. Both of these propositions, however, have been rejected, and estimates will be made of the total cost for each project and on that basis the government will pay one-half the total cost, the other half to be borne by the counties through which the improved roads run. On this basis it will be immaterial to the federal government whether convict or free labor is used under contract. The counties, however, will undoubtedly employ convict labor, as is done on other road work where the state convicts are apportioned to the counties. Judge Patterson, who is a member of the state prison commission as well as chairman of the state highway commission, believes that the working of convicts on the public roads "is splendid for the convicts themselves from a humanitarian and reformative standpoint," but at the same time he believes there are material drawbacks to the operation of convict labor under the system obtaining in Georgia. Judge Patterson held then that there is nothing so beneficial to the character building as working a person close to the soil, "and in a kind of work in which he feels that he is getting some benefits from his own efforts." This class of work, as the judge has described it, is road work. Judge Patterson holds, however, that the state and not the counties, should absolutely control the convicts, and along that line he says: "One serious drawback we have in working convicts on the public roads is the large number of escapes we have. We think this is more than offset by the good accomplished, yet I feel if the state and not the counties had charge of the convicts, and we worked them in larger squads, greater care could be observed in preventing escapes and very often more human and sanitary methods employed in their work. I would advise that the state maintain control and authority over the convicts, as well as the responsibility of their maintenance and work, so that larger forces can be maintained, giving thereby greater efficiency and a higher class of work with less loss of money, time and labor."

Merit Promotion and Economy in Highway Department.

Salem, Ore.—With the view of making promotions on merit, state highway engineer Nunn has written to all the employees of the highway department asking that they send a statement to him giving their experience for the past five years, or since beginning work for the commission. "This is to be used in connection with our personal record of employees and is referred to whenever new positions are to be filled, with the idea in mind of picking those of our older employees for the better positions as they develop, if we can find men on our work who are fitted," reads the letter in part. The engineer has issued circular letters to the employees of the highway department, urging that overtime be allowed only whenever it is absolutely necessary and also the cost of operating automobiles in connection with their work be reduced to a minimum.

Improving Private Ways.

Boston, Mass.—The health department is maintaining the improvement of private ways, at the expense of owners of property abutting on these ways, by resurfacing and draining, repairing or replacing common drains and reconstructing steps leading to such passageways. Many of these private ways are in the rear of apartment dwellings. To secure this action various means are restorted to. The one usually adopted is to invite all the known abutting owners to attend a meeting at the office of the health commissioners, when the needs are explained and plans for

remedying the defects decided on. A committee is chosen by the owners to ascertain what the work will cost; this committee reports at an adjourned meeting, and the cost is usually apportioned according to the frontage on the alley, or as the owners decide. A statement is then drawn up showing the cost and each owner's apportionment. A treasurer is appointed to hold the money; and, when this is all in his hands, orders are given by him to do the work. One of the police officers detailed for service in the health department is assigned to confer with all owners, explain the plan and urge them to pay their share of the cost of the proposed work. This consumes considerable time, for it is necessary to find the real owners; and there are some who object for one reason or another. It is necessary that all join; and the department has no means of compelling co-operation except by an appeal to the criminal courts. Notwithstanding these handicaps, much work was done during the past summer.

SEWERAGE AND SANITATION

City to Pasteurize Whole Milk Supply.

Tacoma, Wash.—The first of the year will see Tacoma's four milk pasteurization depots in complete operation, according to Dr. R. A. Button, milk and meat inspector of the city health and sanitation department. The depots are in the plants of the Tacoma dairy, Royal dairy, MacKinnon Brothers and the Olympic Ice Cream Company. "Thirty-eight hundred gallons of milk come into Tacoma daily," said Dr. Button, "and 2,000 are now pasteurized. We hope to handle the entire amount by the first of the year. This will place the milk of Tacoma at the hands of the inspectors so that we will be able to keep a much better check on it." Dr. Button says that a check is being kept on the Tacoma meat markets which are being brought up to a much higher standard. Most of the arrests made are for selling uninspected meat.

Important Legislation Crippled By Amendment.

Columbus, O.—An opinion of vital interest to cities, sanitarians and public health officials generally has been given to the state department of health by attorney-general McGhee, interpreting the recent Ellis bill, which wrote into the statutes certain amendments to the so-called Bense Act. These amendments which, it was insisted at the time of their passage, were merely to take care of a local situation, it now develops, practically destroy the main purpose of the Bense Act, which was to force purification of public water supplies and the abatement of stream pollution nuisances within the state. The Bense Act provided that municipalities could issue bonds to provide for water purification and sewage disposal to prevent stream pollution, when ordered so to do by the state department of health, without submitting the question of such bond issue to the vote of the people. Amendments to the law in this bill provide that the question of such bond issues shall be submitted to the vote of the electors. Sanitary engineers and public health officials of national repute have frequently cited the Bense Act as a model for other states and regarded it as one of the most efficient weapons in the war on typhoid fever. The question of submitting bond issues for such improvement to the vote of the people is not the only change effected by the amendments. The law as amended provided that the interest and sinking fund levies on account of the bond issues, shall be exempt from the limitations of the Smith one per cent law. "Evidently," says attorney-general McGhee in his opinion, "the General Assembly in creating exemption to tax limitations thought best to safeguard the issuance of said bonds by submitting them to the vote of the electors." Under the Bense Act, city councils were authorized to proceed with the sale of bonds under the existing machinery provided in the Longworth Act. The amended law provides that councils by an affirmative vote of not less than two-thirds of the members elected or appointed thereto, by ordinance, shall issue and sell bonds in such amounts and denominations, for such period of time, and at such rate of interest, not exceeding six per cent per annum, as council shall determine and in the manner provided by law. The bonds authorized to be issued for any such purpose or purposes, in any one year, shall not exceed six per cent of the tax duplicate of the city or village. Under the old law the limitation was five per cent of the total value of all the property listed for taxation in the city or village. The attorney-general holds that section 1259 of the Bense Act as amended is an independent substantive power. Not only do the limitations of the Longworth Act not apply, but the procedure of the Longworth Act is necessarily not applicable. Under the Longworth Act when the question of issuing bonds is required to be submitted to the electors, a favorable vote of two-thirds of the voters at such an election is necessary. The attorney-general holds that in the absence of any specific requirement in the amended section to the Bense Act, the affirmative vote of the majority of all qualified voters voting at the election is necessary. This means that the proposition must receive the support of such number of affirmative votes as constitutes more than half of the highest total vote cast for the candidate for any office filled at election or upon any question submitted thereat. It does not mean a majority of the votes cast on the proposition, nor does it mean the majority of voters qualified to vote at the election.

The amended section is silent on the question of the number of affirmative votes which shall be required on the part of the electors to issue such bonds, also as to the method for holding an election, the form of ballot, and canvassing the vote. "However," says the attorney-general, "the most satisfactory disposition of the question would seem to be to hold that where a statute providing for the submission of a question to a vote of the electors of a subdivision, fails to provide for such matters as the form of ballots and the like, the authority to make such provision must result as an implied power in some officer or tribunal. The officer or tribunal having such implied power must be either the authority which submits the question to the electors or the board of deputy state supervisors of elections." He suggests that the city council of municipalities is the proper authority to determine the form of the ballots for election to be held under the above section. The attorney-general holds that such questions may only be submitted at regular municipal elections, which means that there is an opportunity to vote upon such a question only once in every two years, except in charter cities where frequency with which there may be an opportunity to vote upon the question may be determined by the frequency with which municipal elections may be held under the charter.

Infantile Paralysis After-Care in Massachusetts.

Boston, Mass.—The Harvard Infantile Paralysis Commission, in cooperation with the Massachusetts state department of health, has been engaged since November of last year in providing proper after-care treatment for the children left crippled by infantile paralysis. Clinics have been held for the children in and about Boston at the Children's Hospital and at the Massachusetts General Hospital. In addition clinics have been held throughout the state at the following places: Newburyport, Springfield, Quincy, Lynn, Beverly, Greenfield, Worcester, Malden, Melrose, Lawrence, North Adams and Lowell. While it was the original purpose of the commission to confine itself to the treatment of the persons paralyzed in 1916 only, it was soon found necessary to care for those deformed by the disease prior to 1916. In all, 114 individuals have been treated. In 1916 there were reported to the state department of health 1,917 cases of the disease. Of this number 454 died. No paralysis resulted in 246 cases, and 303 were privately treated. There remained, therefore, 914 persons to be cared for by the commission. The commission has supplied treatment to 698 of this number and its field agents have visited 142 more. Therefore, only 74 persons in the state have not been reached to date. All the treatment and advice has been given free of charge, as well as much apparatus. Transportation has been supplied in many instances by volunteer automobile drivers.

The work of the commission will be maintained as long as the public contributions support the work and the children require treatment.

WATER SUPPLY

Pressure of New Supply Causes Break.

New York, N. Y.—Under the high pressure of the new Ashokan water supply an old 36-inch water main burst in early morning, and hundreds of thousands of gallons were expelled with such force as to break through the concrete pavement. The geyser gushed to a height of six feet or more and inundated a downtown section of the city for blocks. The water poured down into the Interborough and B. R. T. subways through emergency exit gratings and down the stairs of entrances and exits, submerging the third rails and thus cutting off power. For almost ten hours the Interborough was out of business between 14th street and Brooklyn Bridge, and the Manhattan branch of the B. R. T. (Canal street to the Municipal Building) also was blocked throughout the day and until shortly after eight o'clock at night. It was well on in the afternoon before the trains on the subways had worked back into their regular schedules. Patrolman Mayo saw the column of water rip through the pavement. He turned in a call that brought reserves, and a cordon was thrown around the flooded district. Many places were discovered where the streets had sunk alarmingly. The cellar of the Court House was flooded, but the Tombs escaped. The Interborough put two centrifugal pumps to work in the Canal street station, and it took five hours to bring the surface down to the third rail. Superintendent of water supply Mead put a gang of twenty-five men to work locating ten gates in the main three blocks north of the break and ten gates three blocks south, and in two hours these gates were shut and the flood stopped.

Sue Commission for Rate-Reducing Order.

Portland, Ore.—Suit against the public service commission and its members individually has been brought in federal court to enjoin the commission from enforcing an order reducing the Sutherlin Land & Water company's water rates. The corporation serves settlers in the Sutherlin valley in Douglas county. The plaintiffs are the DePauw university of Indiana, the Luse Land & Development company, of Canada; the Northwestern Trust company, of Minnesota, and I. C. Oehler, the trustee of the Oregon concern. The injunction is sought on the grounds that the commission has no right to fix the water rates where a corporation furnishes water only to purchasers of its lands. It asserts that the limitation thus created puts it outside the pale of a public utility and therefore is not within the commission's jurisdiction.

New York City Sells Water to Newburgh.

New York, N. Y.—Last July, the Commission of Water Supply, Gas and Electricity was authorized, in the event of emergency, to permit the city of Newburgh to purchase, at the rate of 10 cents per 100 cubic feet, an amount not to exceed a total of 5,000,000 gallons of water from the Catskill reservoir. Now the commissioner has been empowered to enter into an agreement with the city of Newburgh for a supply of water to the latter from the Catskill aqueduct. The price which it is proposed Newburgh shall pay for New York City water is 10 cents a hundred cubic feet. The initial contract is to be for 500,000,000 gallons instead of only five. The commissioner informed the board that he had investigated the Newburgh water situation and found that city's available stored supply nearly exhausted. Chief engineer of the board of estimate presented a report on the situation. He said: "It appears that in presenting this request to the New York City authorities there was a misunderstanding as to the amount of water which Newburgh might need. Mr. Henry Wilson, the city manager, has advised the commissioner of water supply that the daily consumption of Newburgh is about 4,500,000 gallons, so that the supply which the commissioner was authorized to sell to the city would have amounted to about one day's supply. It appears that what Newburgh intended to ask was authority to purchase a total of possibly 500,000,000 gallons. This statement of the city manager was supplemented by a later communication in which he said that expert engineers were making an investigation as to the best method of increasing Newburgh's water supply, but that, while this investigation was in progress, the needs of the city were dangerously near its present available supply, notwithstanding the fact that the use of water was being restricted in every possible way. The emergency appeared to be a very real one and the city of Newburgh knew of no source of relief except through the favorable consideration by the city of New York of its request. The commissioner of water supply states that arrangements can be conveniently made for discharging water from the aqueduct through a blow-off valve on the Washington Square siphon into Silver Stream, which feeds the Newburgh reservoir, and that this can be done without diminishing the available amount of water which can be delivered into Kensico reservoir for the use of the city of New York and that the sale of this water would be a clear financial gain to the city. The amount which the city would receive for 500,000,000 gallons at the rate above named would be over $66,000 for water which the city of New York does not need at the present time and which represents the total capacity of the Catskill Aqueduct for one day, while the sale of 5,000,000 would represent a return to the city of about $660. There would, of course, be no obligation on the part of the city to continue to supply the city of Newburgh after the amount named above had been taken."

STREET LIGHTING AND POWER

Public Service Commission Economical.

Indianapolis, Ind.—The Indiana public service commission, according to an announcement from E. I. Lewis, the chairman, turned back into the state treasury at the end of the state's fiscal year a total of approximately $50,000 from the appropriation for the fiscal year of 1916-1917. Credit for the reverting of this sum does not lie entirely with the present reorganized commission, Mr. Lewis pointed out. He said that part of the credit is due the former commission presided over by Thomas Duncan, which went out of office May 1. The total appropriation at the command of the commission for the fiscal year just closing was $115,000 and for the ensuing year it will be approximately $109,000. Mr. Lewis said the percentage of savings during the period from May 1 to the present time was greater in proportion than from October 1, 1916, to May 1, 1917. The greater saving made since May 1 is due in great part to the retrenchment of the commission in the number of persons employed by it. The engineering staff has been cut from seventeen persons to eight. The railroad inspectors have been decreased from seven to six, notwithstanding the fact that the commission has been busy with the coal situation, which called for the use of railroad inspectors constantly. The accounting department formerly had eight persons and now has five. When the reorganized commission came into power it found 557 old cases on the docket. The present commission has practically cleared the docket of all utility cases, other than the common carrier cases, although since May 1 an additional 450 new cases have been filed. During the last four years the new cases filed annually have averaged 760. Commissioner Lewis said that the commission expects to have its dockets cleared by January 1. Another important accomplishment was the final disposal of the last of the electric light surcharge cases, which have been holding the attention of the commission since the Indiana Electric Light Association filed a blanket petition, asking the commission to grant its component members authority to add a 30 per cent. surcharge to each of their bills for services to customers, because of the abnormal cost conditions of the war period. The original blanket petition covered twenty-eight electric companies, operated in sixty

Indiana towns and cities. Shortly after the petition was filed it was decided that the electric light association had no power, under the Indiana utility law, to petition the commission, but that the indvidual companies must petition for war time relief. Eventually many companies filed individual petitions for relief, but the records of the commission show that only six companies—after an investigation of the financial situation of all companies which petitioned individually—should have relief, under the attitude toward such cases the Indiana commission has assumed. These six companies, supplying nine Indiana towns and cities, including Indianapolis, received relief by way of orders authorizing surcharges. In granting relief to each of these companies, however, the commission did not take dividends on common stock—at least not to the 6 or 7 per cent. return mark—into consideration. The state body merely made sure, in its relief orders, that a proper depreciation allowance was made and that bond interest was taken care of during the present war emergency. Chairman Lewis said the idea of the commission has been to keep the utility companies "skin-whole" during the war crisis wherever possible, but not to relieve the companies entirely by surcharge relief from all the burdens of the war conditions—to which all the peaple are alike subjected.

The final surcharge petition dismissed was from the Indiana Utilities Company, which operates in several cities in northern Indiana. Chairman Lewis announced, after dismissing this case, following an exhaustive survey of its financial condition by auditors and engineers of the commission, that the commission intends the public generally to know that the state regulating body will "see the utilities through" the present emergency, granting all reasonable relief to the point that will keep the utilities unharmed in operation by the war period's troubles. The utilities generally, Mr. Lewis said, had evidenced a most reasonable attitude toward the present conditions and in many cases in which surcharges were asked, had not asked for the guaranteeing of common stock dividends.

The third important conclusive action, taken by the commission with the end of the fiscal year, was final action on the last one of the petitions under which steam and hot water heating companies asked for wartime relief. Twelve applications for relief of that nature have been filed with the commission during the last few months. These twelve utilities operated in fifteen towns and cities. The commission granted wartime relief to each of the twelve companies, the explanation for this wholesale action readily being visible in the fact that these companies find the greatest factor in their operation in the coal situation. The "outrageous" prices charged Indiana utilities and the public generally for coal has been reflected in all of these heating cases, compelling the commission to take cognizance of it throughout. The relief granted these heating companies by orders from the commission varied from 2 cents a square foot of radiation to 6 or 7 cents a square foot, except in the Crawfordsville case and a special agreement case at Terre Haute, where the customers of a small heating plant of the Terre Haute, Indianapolis & Eastern Traction Company agreed to an increase of from 50 per cent. to 100 per cent. in their bills for the season because of the war situation. In the Crawfordsville case the commission's engineers showed that an 8-cent increase was imperative to save the company's property. In these increases in heating rates the commission's orders invariably have limited the addition of the surcharges to the ensuing heating season and in no case will the authority for such increases extend beyond one year, under the recent orders. The last case of the sort handled by the commission was that in which the Laporte Gas and Electric Company had petitioned for authority to increase its heating rates from 17 cents to 25 cents a square foot, and to discontinue its hot water heating service for range boilers. As in the Crawfordsville case, where an agreement between customers and the company finally had been arranged, the commission sent the petitioners back to Laporte to arrive at an agreement with their customers. An agreement was reached, which the commission approved. Under its terms the company is allowed to increase its rates from 17 cents to 20 cents a square foot of radiation and to place a charge of $7.50 to $10 for the range boiler service.

Vote Against Sale of City Plant.

Marshalltown, Ia.—By a majority of 252, out of about a two-thirds normal vote, voters refused to authorize the proposed sale of the city's street lighting system to the Iowa Railway and Light Company for $15,000. By a majority of 233 the voters refused to sanction the proposed contract under which the city may purchase street light from the Iowa Railway and Light Company. Failure of voters to vote on the questions, their indifference, and their lack of information, or their voting under misinformation on the subject were said to be accountable for the proposals not carrying, and thus, it is claimed, saving the city $3,000 a year in taxes and getting eighty-four more lights for intersections. The Marshalltown Club and the Marshalltown Trades and Labor Assembly endorsed the city council's proposal to sell the old, worn-out street lighting plant for $15,000, and buy more lights from the local utilities company, for the following reasons:

"1. The price of $15,000 is a good price for a property which our city electrician has appraised at $9,000, and the present plant is wholly inadequate to supply our city with the additional lights needed. 2. It would cost nearly $50,000 to build a new plant and war prices for electrical material are prohibitive at the present time, with machinery almost impossible to obtain until the war is over. 3. The operating cost of such a plant would be $2,350 per annum, more than the city can purchase its lights based upon the city's present cost, and this would save us $23,500 in ten years. 4. Our council can and will reduce our tax levy for street lighting purposes because the $15,000 received from the sale, together with the tax already levied for next year, will make it possible to reduce said street light levy of 5 mills to almost nothing for approximately three years after this year, and it will make some reductions in our present street light tax possible for the entire ten-year period proposed in the rates now offered to the city. 5. We are convinced that it will not be economical for the city to produce its own street lights until it is ready to take over the entire lighting business of the city, "both private and public." The refusal of the voters to authorize the sale, while it prevents th council from selling the plant, does not prevent the council from entering into a contract for the purchase of the light. It is probable that the council will do this because of the saving that can be made and for the sake of procuring more lights. In event that it is done the city's plant will stand idle and will depreciate rapidly. In fact, it is said, that it cannot now be sold, other than to the Iowa Railway and Light Company on the offer made, for anything more than junk prices. It would, however, be possible for the city council to contract for light, save $3,000 a year by doing so, and thus reduce the tax levy for lights after next year to probably 4 mills, instead of 5 mills, the present levy. The latter levy is the maximum the city can levy for street lighting, so that it has no means of raising the money for the rehabilitation of the plant except by a bond issue.

FIRE AND POLICE

Industry Halted by Power Plant Fire.

Charleston, W. Va.—A blaze which partially destroyed the power plant of the West Virginia Water and Electric Company put the industries and business of the whole city dependent on this current out of commission for more than a day. By connecting up with the power plant of the Charleston Interurban Railroad Company the West Virginia Water and Electric Company was able to furnish power sufficient to operate all plants in the city using its service, to enable resumption of elevator service in all buildings, to provide water for the South Side and to insure lighting throughout the city. The voltage was maintained until repairs in progress on the partially burned electrical station at the power plant was completed. From the moment that the interior of the power and light plant became cool enough to allow officials and employees to enter the most strenuous efforts were put forth to rig up the badly damaged machinery and give

light for the city. Conservative estimates place the damage done manufacturing concerns, theatres, pool rooms, cigar stores, restaurants and other places of business open in the evening at more than the loss done to the light plant by the fire. Newspapers were also at a considerable loss because of the fire. Throughout a day and night the people of South Side heights were without water, and springs and wells were much sought. Electric service was given in that part of the city all night, but the lights were rather dim and inefficient. Lack of water in that elevated residential portion of the city was due to lack of power to pump water up the stand-pipe, located on the highest hill of the tenth ward. In the business district downtown merchants were greatly inconvenienced for lack of power to run the elevators in their buildings, and all day employees were put to the necessity of carrying goods up and down stairs.

Change in Two-Platoon System.

Buffalo, N. Y.—A change in the two-platoon system, in use in the fire department recently, became effective. Instead of changing shifts every week—on Saturday—the firemen now change every six days. President John J Flood, of the Dauntless Club, the firemen's organization, took the matter up with chief Bernard J. McConnell, and urged that the change be made. Under the old method the firemen worked one long Saturday, staying in quarters twenty-four hours uninterruptedly. Each alternate Saturday they were off duty from Saturday morning to Sunday morning. Mr. Flood pointed out to the chief that the firemen were absent from home each alternate Saturday and that in a measure they were deprived of spending time with their children. Inasmuch as Saturday is the only day the children are home from school, Mr. Flood asked that an arrangement be made to permit the long working day to fall some other day of the week. When the two-platoon went into effect in July, 1916, the firemen's leaders urged that a change be made every third day, but chief McConnell decided to try out the weekly change at least for a year. The firemen say the change every sixth day will please them and at the same time not impair the efficiency of the department.

Two-Platoon System Causes Insurance Rates Raise.

Tacoma, Wash.—Three days after the fire department started on the double shift, property owners throughout the city were notified that their insurance rates had been raised 15 per cent. by the Washington Fire and Rating Bureau on account of "decreased efficiency of the fire department." At a conservative estimate this raise will cost the property owners of the city $75.000 yearly. To hire the forty additional men, which had previously been asked by the commissioner of public safety for the remainder of this year, would have cost, in round numbers. $12,000. Their pay for any one year would not exceed $45 000. The department of public safety states that: "In one instance the people of the city are penalized $75 000 and have no increased protection. In the other they have as much or more fire protection as formerly, and every cent goes to local citizens whose homes and interests are in this city, and at a saving of at least $30.000 a year. As to how the fire department can operate a double shift with the same number of men formerly on single shift, the matter is explained. first, by saying frankly that the efficiency of the department has decreased at least 30 per cent. The question that first confronted the department was: Should the outlying stations be abandoned and the central fire stations fully manned, or should all of the stations be operated with half of the number of men? In either case it would be necessary to abandon all preventive inspection work. It was realized that much territory in the outskirts had been given but little protection, and that past reductions in the number of men had compelled the abandonment of one outlying station (No. 10) and lowered the number of men in other outlying companies. Again the abandonment of No. 10 had proven serious, as it had been impossible to save houses in this district after the companies had arrived from No. 13 the next station. Under these conditions the only workable solution was to operate all stations, as then all apparatus, at least, would be available in case of a conflagration. Therefore, all companies were kept in operation, and the number of men on duty at any one time was approximately half the number formerly attached to each company. A little leeway was gained because, during the 24 hours that the men formerly worked three meal hours were provided for each man. Thus during nine hours of the day the companies were short each from two to three men. Also each man on a company was off one day in eight, and so it had been necessary to maintain in each engine company of seven men one relief-man, which made the total strength of eight men, but as one man was off each day the average strength would be reduced to seven men, while the minimum strength of such company during the meal hours would be only four or five men. No meal hours are granted under the two-platoon, and there are no days off, so that the efficiency is considerably more than half, so far as men are concerned, and all of the apparatus is maintained in service. Formerly most of our engine companies were seven-men companies with one relief-man. Some of the hose companies have been reduced as low as two men per shift, which is too low to handle hose and apparatus. Chief F. L. Stetson, of Seattle, says that the minimum number of any engine company should be eight men. In Portland the number is nine men. The difficulty of operating an engine company with only three or four men is easily seen. It means a tremendous slowing up in getting a stream on the fire at a time when every second counts. The fire preventive inspection which has been rigorously maintained, but which the department was compelled to abandon on the advent of the two platoon, could be carried on again if the additional men asked were granted. It is admitted that thorough fire inspection has reduced the number of alarms in the last year 15 per cent. It is courting disaster to abandon it. Under the rules establishing the double platoon, all firemen must maintain telephones in their homes, and respond on second alarms. This gives the city the benefit of the whole force in case of conflagration This, however, would at present be no more men than the city has always had in service. If additional men were allowed it would be a factor providing protection during great fires, which, fortunately, the city has never had, as yet. The fact remains, moreover, that it is the height of folly to allow the insurance rates to be raised so that the total cost to property owners will be almost double the amount necessary to put the department on an efficient basis."

Nineteen Dead in Mission House Fire.

Paterson, N. J.—Eighteen bodies were taken from the wreck of the four-story brick Salvation Army Rescue Mission swept by an early morning fire which cut off scores from the single fire escape and forced many to leap from windows at the third and fourth floors. The nineteenth victim died in the hospital to which ten others were taken. Spectacular rescues cut down the toll of the flames, but many persons died in the frantic scramble for exits, five being found in a heap at the foot of a charred stairway. Cripples and rheumatic old men, helpless to struggle against those who fought to reach the stairs, suffocated or were burned to death. Inspector of Buildings John Quigley insisted that both state and municipal laws had been complied with and that there was a sufficient number of exits to meet the law's requirements. The mission was a red brick structure of wide front built twenty-two years ago, and gave free lodging to those who could not pay for beds and who were willing to chop or saw wood. The building had 140 beds. Eighty-four men were asleep in the building when the fire started. In the rear of the mission was a one-story wooden shed, separated by only a few yards from the main building. Adjoining the mission and the shed was a two-story stable. In this and the shed were stored varnish and a great quantity of old newspapers and magazines that had been collected by lodgers. In the yard, about fifteen feet from the fire escape at the rear of the mission, was a pile of cordwood 20 feet high. The

night clerk and watchman glanced from the rear window at 1 o'clock in the morning and saw a spark flickering in the paper-stocked shed. In a moment the wind had fanned the spark into flames. He rushed upstairs, shouted "Fire" and rushed back to the desk. The watchman at a nearby silk mill saw the flames and sent an alarm. Two blocks away a man saw a tongue of fire shoot up and he, too, turned in an alarm. Tre resultant mixup at fire headquarters delayed apparatus several minutes. Fed by paper, cord wood and excelsior that had been piled under the fire escape, the flames swiftly ate their way, with the aid of a stiff breeze, along the rear of the main building. Lodgers in the basement reached the street with little trouble. As the flames crackled into the building the men asleep on the third and fourth floors became panic-stricken. Scores rushed to the rear to run down the fire escape. They were flung back by sheets of flame. They plunged toward windows on the side and were stifled by smoke. Then they fought their way to the roof and looked down on the street. Firemen had spread a net. It was the only means of escape. Tearing at one another in a mad scramble for a chance to leap to the net several lost their balance at the edge of the roof and fell over. But by great luck they landed safely in the net. Eleven dived into it. A twelfth man was poised on the cornice preparing to leap, when from behind rushed a figure that jumped, striking him and hurling him out and down. He struck the railing of the stoop and received injuries which caused his death. Police Lieut. Joseph Mosley and patrolmen William Fitzgerald, Eugene Wilde and Fred Bishop dashed through the second and third floors of the mission, pulling and shoving men to the wooden stairway. But the flames and smoke were too much for the policemen, and after several rescues they had to stagger back to the street. Frank Costello, sixty, a lodger, formerly a Paterson fireman, gave his life to save men on the fourth floor. Imploring them to file out as calmly as possible, he remained behind to help until his last chance to reach safety had been cut off. Eleven bodies were found on the fourth floor, charred in their cots. Two bodies were on the third floor.

Burning Almshouse Saved by Long Run.

Atlantic City, N, J.—After a run of eight miles across the meadow boulevard, two companies of Atlantic City's motorized fire department saved the county almshouse at Smiths Landing on the mainland from destruction by fire. A wagonshed in which the fire started and a barn containing hay stored for the winter were destroyed with an estimated loss of $15,000. Several horses were saved. A fire company from Pleasantville found that its hose line would not reach from the nearest plug to the blaze, and the $80,000 almshouse with nearly 100 inmates was in grave danger when the Atlantic City companies arrived and went into action with chemical batteries and water lines. An engine company which came from Somers Point, eight miles distant, also did effective service.

Big Pier Fire Arouses Baltimore.

Baltimore, Md.—Burning a big freighter and its valuable cargo, a number of lighters and two huge piers, a difficult fire, ascribed to an incendiary, caused damage estimated at between $4,000,000 and $5,000,000 and the loss of a number of lives. The result has been the arrest of three suspects and the drawing of a tight net around the waterfronts of all cities in the country against enemy aliens. The fire occurred at piers 8 and 9 of the Baltimore & Ohio Railroad's big terminal development and for a time the railroad's grain elevators, containing grain for the Allies, were in danger because of the wind blowing in their direction. On the burnt piers were stored large quantities of munitions and there were five explosions at about the same time. The ship Kerry Range, which had arrived in port the day before, was a total wreck. The firemen found that the anchor had been dropped and the ship could not be moved. The crews of the Deluge and Cataract, the two city fire-fighting boats, and the fire-fighting tugs of the railroad company and other transportation concerns in the harbor worked on the burning vessel. Finally the great freighter was cut loose and was backed clear across the harbor to Canton Hollow. Holes were cut in the side of the vessel, so that the coal bunkers might become flooded, and as a consequence the ship settled in about 18 feet of water, and the stern rested on the ground. The water did not quite reach the coal bunkers and for hours the firemen swarmed over the top decks and down into the smoke-filled hold. Time and again the men were driven out of the hatches and the holes, which they had cut in the decks. There were about 15 men on board when the fire started and a number of these and of pier workers were missing. The whole fire department was engaged in the battle and the mayor hurriedly left a dinner party and rushed to the scene. The sharp, biting wind of the early hours before dawn caused a great deal of hardship and suffering to the men who had been battling with the flames. Nearly fifty of them were overcome, either by the cold wind that blew in or by the fumes of the burning wood pulp. The firemen, as they fell from exhaustion, were helped to places of safety by their companions and attended by the fire department physician, Dr. J. J. Valentini.

Two Firemen Burned.

Tulsa, Okla.—Ross Shepherd and Ben Manes, two members of the Tulsa fire department, lost their lives in a fire which destroyed a half block of business houses, entailing a loss estimated at approximately $475,000. Both men were killed when a stairway fell, pinning them under the ruins. The fire was the most disastrous in Tulsa's history and low water pressure, caused by scarcity of gas, made the fire fighting difficult.

Difficult Fire Breaks Out in Ruins.

Cleveland, O.—After being apparently under control for two hours the flames which destroyed the Nottingham building broke out afresh, and threatened to completely destroy another large store building. The firemen were unable to reach the new blaze, being blocked by the smouldering ruins. Streams from water towers fell short. After twelve hours of strenuous fighting, the fire, which had eaten into the heart of the retail business district of Euclid avenue, was under control at ten o'clock next morning. Damage between $300,000 and $400,000 was done to three of the biggest clothing stores in the city and to smaller shops and office buildings. Five times during the night and morning the firemen announced the blaze was under control only to have it break out again in another quarter. Fanned by a brisk wind from the lake the flames spread to adjoining buildings. The greatest damage was done by smoke and water.

Big Garage Fire Burns Many Trucks.

Philadelphia, Pa.—In the destruction by fire of the Adams Express Company garage between seventy-five and one hundred of the company's automobile delivery trucks and the entire building, covering more than an acre, were consumed within two hours. It was the third fire of a quarter million dollars' proportions in that vicinity within the last six months. The flames, fed on timbers and gasoline-soaked walls, spread through the building with startling rapidity after the nearby engine companies responded to the first alarm. All street traffic for two blocks in every direction of the building had to be suspended, while surface cars were put out of commission. Several cleaners were in the building when the watchman saw a sheet of fire sweep up the front elevator shaft. For almost a half hour the firemen combated with the flames. They were hopeful of confining the blaze to the front of the building, when a series of gasoline tanks exploded. Then the fire mushroomed to the upper floors, sending sparks high into the air. A combination second and third alarm were sent to fire headquarters, and within fifteen minutes later a fourth and fifth call for all the downtown fire apparatus were sounded. Fanned by a brisk wind, the burning brands showered on neighboring buildings and at least eighty streams of water were in action to prevent a greater destruction of property. Two blocks away was a herd of

about twenty five steers being led to railroad stockyards. The whistles of the motor engines and the ringing of the truck bells almost immediately threw the animals into confusion. Their hostlers fought with them, but half of the herd stampeded into the street. Marines and soldiers formed a herding party and helped round up the animals in nearby barns. High tension electric wires stretched along one side of the building, placed two companies of fire fighters in peril as they attacked the flames from the roofs of nearby buildings. The streams from the hose line tore down several sections of the wires, which was followed by a short circuiting that put out the street lights for several blocks.

Firemen Get One Day Off in Five.

Elmira, N. Y.—The fire commissioners have decided that the firemen in the city employ shall have one day off in every five. Heretofore one day every sixth day has been granted to the men. The fact that they are on duty continuously, being required to be at their headquarters constantly, is responsible for the added relief given under the ruling.

Six Firemen Hurt in Wharf Blaze.

Boston, Mass.—Fire, which it is suspected may have been intended to destroy the storage sheds of the United States Navy on Battery wharf, caused loss which may reach $150,000 to storage sheds on Constitution wharf. Six firemen were injured, being caught under falling bales of hemp while fighting the flames within the shed, and two horses attached to the hose wagon of Engine 4 were killed. Something that fell from the "L" structure frightened the horses, and, after running nearly a mile, they dropped into a ditch, dug for water mains, in North street. One was instantly killed, and the other was shot. There were two explosions, one closely following the other. One end of the shed, which is a story and a half high, broke into flames almost immediately. Four alarms were sounded, there being serious danger of the fire spreading along the waterfront. The burned shed is separated from the naval storage shed by only a narrow space. The burned shed was filled with general stores, including thousands of bales of hemp, barrels of oil, quantities of cotton waste and about 150 automobiles, which had been received from the railroads. Not all of the hemp was burned, but scarcely a bale escaped water damage. In addition to the land apparatus, three fireboats worked to keep the flames from spreading, the fight for the most part being conducted at close quarters because of restricted space.

War on Flimsy Lodging Houses Follows Fire.

San Francisco, Cal.—The board of health has taken steps to close all the fire-trap lodging houses in the city. Civil suits against the owners, tenants and lessees of nineteen lodging houses in this city, condemning their houses as fire-traps and a menace to public health and safety, and asking for a court order to have them vacated, were drawn up in the district attorney's office by assistant district attorney A. B. Biancchi, acting as attorney for the board of health. These suits were filed in the civil court. The name of Arthur Barendt, president of the board of health, appears as the complainant. The complaints recite that the owners or lessees are maintaining as lodging houses buildings with defective plumbing, poor sewerage and ventilation, thereby rendering them a menace to public health and safety. The complaint also asks for an order from the court to have these premises vacated until such time as repairs are made or the places are condemned. This action grew out of the tragedy of the Owl lodging house, which proved to be a fire-trap when it caught fire, costing the lives of assistant fire chief Stephen D. Russell and two firemen. At the coroner's inquest it developed that the board of public works had no jurisdiction over the condemning of such buildings as long as the building law was complied with. The coroner's jury demanded that the board of supervisors pass the necessary ordinances to protect the lives of the firemen. Thomas R. Murphy, chief of the fire department, and John Horgan, chief building inspector of the board of public works, were called to the witness stand during the inquest. Inspector Horgan testified that the board of public works had no jurisdiction over condemning such buildings when they comply with the building laws. Chief Murphy testified that he had answered the Owl lodging house fire after the third alarm had been sent in, and when he saw that the building was in danger of falling he ordered all his men to leave. He said he did not believe that Russell and the other two men were disobedient when they remained in the building, but he attributes the fact to their anxiety to reach the base of of the fire. The State Bureau of Immigration and Housing is backing the state board of health and the board of public works in the condemnation of flimsy rooming houses and hotels. The legal action is being taken under the new regulations of the Immigration and Housing Commission, which became effective September 1.

NEW TRIPLE COMBINATION FOR SYRACUSE, N. Y.

MOTOR VEHICLES

Towards an All-Motor Department.

Newark, N. J.—Eight more pieces of fire department apparatus will be motorized as a result of recent action by the fire board. The tractors will be for truck companies Nos. 4 and 8, and one of the reserve trucks, the steamer and hose wagon of engine company No. 12, the hose wagon of Engine Company No. 15, the water tower and the wrecking car. The steamer of Engine Company No. 15 already is motorized. When these plans are carried out all the truck companies of the department will be motorized.

New Pumper Does Well in Test.

Syracuse, N. Y.—The fire department recently received from the American-La France Fire Engine Co., Elmira, N. Y., its new type 75 triple combination piston pumping engine. A test was held at the canal under the supervision of master mechanic Trotter. The pump is rated at 800 gallons, at 120 pounds pump pressure, but during two hours of the four-hour test, it easily developed a capacity of over 900 gallons per minute at 120 pounds. The machine has a hose body for 1,200 feet of 2½-inch fire hose, equipped with a forty-gallon Babcock chemical tank and 200 feet of ¾-inch hose. It carries a twenty-foot solid side extension ladder and a 12-foot roof ladder. The car is equipped with a self-starter. The tires are United States, solid.

Whole Department to Be Motorized.

Terre Haute, Ind.—The first of the three new Seagrave pumping engines has been received and tested out. The machine weighs 12,820 pounds, has a 126-horse power motor and is capable of a speed of 60 miles per hour. This machine is guaranteed to throw 750 gallons of water per minute, but can do much better under favorable conditions. The old engines, which the new motor machines are displacing, were capable of throwing about 600 gallons per minute. This pumper takes the place of two pieces of apparatus and does away with four horses. It carries complete fire-fighting equipment. Two more pumpers, similar to the one already received have been ordered and

will arrive in the city within a short time. When these two machines arrive and are accepted the motorization of the Terre Haute fire department will have been completed and it will have 19 pieces of motor apparatus. It is claimed that Terre Haute then will be the first city in Indiana to have a complete motor fire department.

Vote for Purchase of Motor Apparatus.

Natchez, Miss.—Of the entire vote in the special municipal election, held to determine whether or not the city should purchase motor fire apparatus to supplant the present antiquated and insufficient equipment of the No. 2 and No. 7 fire companies, there were only five ballots against the proposition, while 509 gave endorsement. The result of the election means that the bids of the various manufacturers of motor fire apparatus will be considered and contracts awarded. With the authorization given by the election the city will expend $13,500 for two pieces of motor fire apparatus. For the No. 2 company a combination hook and ladder truck will be purchased; for the No. 7 a combination hose reel truck.

MISCELLANEOUS

Municipal Lake Resort Profitable.

Fort Worth, Tex.—Lake Worth is a paying proposition, according to city auditor Adams, who has produced figures to back up his statement. He showed that when the municipal bathing-house was opened in June the city commission was forced to pay for the building and equipment and borrowed $15,000 to start the season. Since the opening in June the crowds which have taxed the capacity of the pavilion have paid their fees for the privilege of using the lake, and to date the building and equipment has been entirely paid for and the city has $5,890.29 on hand to pay on the $15,000 note. Mr. Adams stated that while the lake possessions would not be paid for by the end of this season, but by the early part of the next season the city will be out of debt on the lake. The city commission, led by mayor Davis, is planning many improvements for the beach and the pavilion, which will be made as the money derived from the sources at the lake rolls in next summer and each summer thereafter.

Public Utilities in New Jersey.

Trenton, N. J.—The state board of public utility commissioners has issued its statistical report for the calendar year 1915. The general revenue and expense figures for the various groups of utilities in the state are as follows:

	Operating Revenues	Operating Expenses	Operating Ratio (Per Cent)
Electric railways	$19,110,000	$10,230,000	53.5
Gas companies	13,190,000	6,535,000	49.5
Private electric utilities	12,650,000	5,095,000	40.3
Municipal electric utilities	163,000	101,000	62.2
Private water utilities	4,720,000	1,610,000	34.1
Municipal water utilities	5,550,000	1,945,000	36.4
Telephone companies	9,815,000	4,325,000	44.1
	$64,998,000	$29,841,000	45.9

This table includes the revenues and the expenses of every utility whose gross revenues for the year exceeded $10,000—or 99 per cent of the total gross revenues of all utilities in the state.

Court Upholds Regulation of Parking Space Use.

Washington, D. C.—Chief justice Covington of the district supreme court has sustained the right of the district commissioners to exclude from use by merchants the parking space in front of their places of business. He denied a petition of Joseph L. Crupper, a lumber merchant, for a mandamus to compel the commissioners to rescind an order to him to remove lumber piled in front of his yards. The court holds that the action of the commissioners involved the exercise by them of a discretion reposed in them by sundry irrelevant acts of Congress. No abuse of this discretion is disclosed in the case at bar, the court declares. "No words can be found," says the chief justice, "either in the last proviso of the act of July 1, 1898, or the amendment of the act of February 2, 1904, which grants to the abutting property owner any right in the sidewalk or parking in a business street on which his property abuts. At most the commissioners were simply directed to permit him to use such portion of it as in their judgment might not be needed by the general public under such general regulations as they may prescribe. And the fact that Mr. Crupper, as an owner of property abutting on a business street, is not able to use the parking in front of his property under regulations presumably sufficient for many other citizens, while possibly a misfortune to him, does not operate to prevent the regulation from being one of general application." The court finds that the regulation is a compliance with the mandate of the statute and declines to interfere with its operation

LEGAL NOTES

A Summary and Notes of Recent Decisions—Rulings of Interest to Municipalities

Installing Fire Sprinkler—Power of Fire Commissioner.

(N. Y. Sup.) Power of fire commissioner of Greater New York to order installation of automatic sprinklers without rules held not taken away by ordinance that all buildings shall be provided with such sprinklers as may be required by and conforming to rules of the fire commissioner.—People ex rel. Adamson v. Miller, 165 N. Y. S. 790.

Testing Fire Engine—Liability for Damages.

(Neb.) Where city motor vehicle, assigned to fire department, was being tested under its direction and was not in performance of any governmental duty, such as answering emergency call, city is liable for damages caused by its unlawful operation.—Opocensky v. City of South Omaha, 163 N. W. 325.

Dismissed Fireman—Right to Pension.

(Minn.) Where a fireman was dismissed for cause and his application to be placed upon pension roll of fire department relief association was denied, and he took no steps to be put on pension rool for over twelve years, his action therefor was barred by limitations.—Lund v. Minneapolis Fire Department Relief Association, 163 N. W. 742.

Resignation of Employe—Civil Service.

(Minn.) Where city employe filed his resignation, and found other employment, the resignation and acceptance was a voluntary relinquishment of office by a method not in violation of city's civil service policy.—Byrne v. City of St. Paul, 163 N. W. 162.

Limiting Buildings Within Fire Limits.

(Ky.) Under Ky. St. § 3490, council of city of fourth class had power by ordinance to prohibit erection, within specified fire limits, of buildings made of frame or wood, part frame, hollow concrete blocks, and iron-clad or veneered structures or tents.—Galanty & Alper v. City of Maysville, 196 S. W. 169.

Violating Fire Limits Law—Penalty.

(Ky.) Where city's fire limits ordinance provided penalty by fine for violation, remedy was not exclusive, but city could, in civil case, secure removal of building erected or repaired in violation of ordinance.—Galanty & Alper v. City of Maysville, 196 S. W. 169.

Erecting Buildings in Conflict With Ordinance.

(Ky.) Despite Ky. St. § 3490, council of city of fourth class could not grant permission to individual to erect building in conflict with its general ordinance, prohibiting erection of such buildings within specified fire limits.—Galanty & Alper v. City of Maysville, 196 S. W. 169.

Municipal Advertising—Lowest Bidder.

(N. J.) Publishing of municipal advertisements in newspapers is neither "work, labor nor materials" furnished by owners of papers, under P. L. 1912, p. 593, requiring municipalities to let contracts therefor to lowest bidder.—Dolker v. Board of Chosen Freeholders of Atlantic County, 101 A. 370.

NEWS OF THE SOCIETIES

Calendar of Meetings.

Nov. 13.—NATIONAL TAX ASSOCIATION. Annual conference, Atlanta, Ga. Secretary, Fred R. Fairchild, Yale University, New Haven, Conn.

Nov. 14-16.—FIRE MARSHALS ASSOCIATION OF NORTH AMERICA. Annual convention, New Orleans, La. Secretary, W. M. Campbell, New Orleans, La.

Nov. 15-16.—ASSOCIATION OF URBAN UNIVERSITIES. Annual meeting, Pittsburgh, Pa. Secretary, Frederick B. Robinson, City College, New York, N. Y.

Nov. 19-24.—CITY MANAGERS' ASSOCIATION. Annual meeting, Detroit, Mich. Secretary, W. L. Miller, City Manager, St. Augustine, Fla.

Nov. 20-21.—ASSOCIATION OF GOVERNMENTAL RESEARCH AGENCIES. Third annual meeting, Detroit, Mich. Secretary, C. O. Dustin, Statistical Bureau, Red Cross War Council, Washington, D. C.

Nov. 20-23.—PLAYGROUND AND RECREATION ASSOCIATION OF AMERICA. Recreation Congress. Secretary, H. S. Braucher, 1 Madison Ave., New York, N. Y.

Nov. 21-24.—NATIONAL MUNICIPAL LEAGUE. Twenty-third annual meeting. Hotel Statler, Detroit, Mich. Secretary, Clinton Rogers Woodruff, 703 North American Bldg., Philadelphia, Pa.

Jan. 3, 4.—NEW JERSEY STATE LEAGUE OF MUNICIPALITIES. Annual convention, Trenton, N. J. Secretary, Clinton A. Swartz, Trenton, N. J.

Jan. 15-17.—VIRGINIA GOOD ROADS ASSOCIATION. Seventh annual convention, Richmond, Va. Secretary, C. B. Scott, Richmond, Va.

Feb. 6-13.—FIRST CHICAGO CEMENT MACHINERY AND BUILDING SHOW. Supersedes annual Chicago Cement Show. Held at the Coliseum, under direction of the National Exhibition Co.

March 17-24.—PAN-AMERICAN CONGRESS ON CHILD WELFARE, Montevideo, Uruguay. Secretary, Edward N. Clopper, 105 East 22d Street, New York, N. Y.

National Municipal League.

"Cities During War Times" will be the dominant theme of the annual meeting of the National Municipal League at Detroit, November 21-24. One entire session will be devoted to the topic, "Feeding Our Cities in War Time," the principal speaker being George W. Perkins, chairman of the New York Market Commission, who will address himself to the subject of state organization for food supply. President Marcus M. Marks, of the Borough of Manhattan, will speak on wholesale and retail markets, and a representative of the National Food Commission on "How the Cities Can Effectively Assist in the Food Crisis." Still another subject will be "Agents for Better Local Distribution of Food."

A session will be devoted to the "War Time Experiences of English and Canadian Cities," over which W. D. Lighthall, K. C., of Montreal, will preside. Among the speakers arranged for this meeting are Sir George Gibbons, Mrs. H. P. Plumptre, secretary of the Canadian Red Cross Society, and Mayor Church of Toronto.

The annual review of the secretary, Clinton Rogers Woodruff, of Philadelphia, will deal with "American Cities During War Time and Their Problems."

Underlying all the sessions will be the thought, "What must we do to make our cities effective during and after the war?" Consequently the city manager form of government, budget making and training for public service will come in for a large share of attention.

One of the questions to be discussed in conjunction with the City Managers' Association, which will meet in Detroit at the same time, is "Will the City Manager Form of Government Fit All Cities." President Lawson Purdy will preside at this meeting, and the speakers will include Richard S. Childs, of the National Short Ballot Organization, City Manager Cummins, of Grand Rapids, George B. Harris, chairman of the Republican City Committee of Cleveland, L. D. Upson, of the Detroit Bureau of Governmental Research, City Manager Carr and Commissioner George W. Knox, of Niagara Falls, and City Manager Waite, of Dayton.

The question of executive or legislative budgets will be the theme of another session, to be held in conjunction with the bureaus of governmental research, likewise meeting at the same time in Detroit. The discussion will be opened by Dr. Frederic A. Cleveland, of Boston, formerly director of the New York Bureau of Municipal Research, and Dr. E. A. Fitzpatrick, of the University of Wisconsin, the former maintaining that the executive should frame the budget and the latter that the legislature should. The discussion will be opened by Arthur N. Pierson, of Westfield, N. J., who is a member of the New Jersey legislature and was the leader responsible for the important financial legislation recently enacted by that state and by Dr. Charles A. Beard, of New York.

Judge Connelly of Detroit, will preside over a luncheon at which Professor Charles E. Merriam, of the University of Chicago, will discuss the question, "Can We Have Non-Partisan City Government." Speakers from leading cities like Cleveland, Detroit, Seattle, San Francisco, Los Angeles, Boston and Toledo will consider the question of whether the non-partisan ballot eliminates the party machine in large cities.

At the dinner on Thursday evening the executive budget will come in for further consideration at the hands of Governor Cox, of Ohio. The important administrative reorganizations in Illinois and Kansas will, it is expected, be discussed by Governor Lowden, of Illinois, and Governor Capper, of Kansas.

"The City and County" will be the subject of another session, at which will be considered the experiences of Baltimore, Denver and California. Among the speakers will be City Solicitor S. S. Field, of Baltimore, Geo. C. Sikes, of Chicago, and Willam B. Guthrie, of New York.

"Selling Good Government to the People" will be the theme of a luncheon presided over by J. Horace McFarland, of Harrisburg, who will himself speak on this theme along with Dr. D. F. Garland, the director of welfare in Dayton, who will speak on "Humanizing Welfare Reports."

A session on training for public service will be presided over by President Hutchins, of the University of Michigan, at which the speakers will be City Manager Gaylord C. Cummins, of Grand Rapids, Dr. William H. Allen, director of the Institute for Public Service, New York City, and Richard H. Dana, president of the National Civil Service Reform League and a representative of organized labor.

President Lawson Purdy's annual address will deal with the highly important subject of "Municipal Pensions."

Meeting in conjunction with the National Municipal League will be the Civic Secretaries Committee and the Intercolegiate Division of the League, the City Managers' Association, the Bureaus of Governmental Research and the Society for Promotion of Training for the Public Service.

Pennsylvania Waterworks Association.

Over one hundred water works engineers and officials of water works companies attended the sessions of the annual convention of the Pennsylvania Water Works Association, which was held at Atlantic City, N. J., Oct. 17-18.

J. P. Purdy, general manager of the American Water Works and Electric Company, was re-elected president; W. D. Pollard, general manager of the Pottsville, Pa., Water Works Co., was elected vice-president, and A. W. Lee, of Clearfield, Pa., Water Works Co., was made second vice-presiednt; F. S. Purviance, of Pittsburgh, was re-elected secretary and treasurer.

President Purdy's address was brief and covered the work done by the association in regard to reformations which have improved the service to the public, touched on the war and its problems of making it difficult to secure the iron and steel supplies, and believed that the future promised greater developments and prosperity.

The feature of the session was the detailed account of the experience of Morris Knowles, of Pittsburgh, who was the engineer in charge of putting up the camp at Admiral, Md., where thousands of men, the maximum number reaching 10,500, worked day and night from July 1. Metal pipe was scarce and wood pipe was used in the installation of the water and sewer systems. For water, 20 miles were used, and for sewerage, 30 miles. Forty-five million feet of lumber was fashioned into buildings, a million feet a day being used. Water was secured

(*Continued on page 478*)

NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

TRUCK WITH WINCH.

For Fire Alarm System Maintenance Work.

An excellent example of the ever-increasing variety of uses for motor trucks in municipal service is the work of a Federal machine by the Detroit, Mich., fire department in the telegraph corps division. On this truck depends to a large extent the keeping up of the alarm system of the city, without which the fire department would be almost helpless.

Detroit's growth to the claimed population of 850,000 people, almost half of which has come in the last ten years, necessitates a great deal of new wire installation by various departments of public service, and this Federal performs theh work for this division of the service in a very satisfactory manner. An interesting feature of this truck is the winch, which is mounted just at the back of the seat, which is shown in detail in one of the cuts. This is a type "A," O. K. winch, mounted on a 3½-ton chassis, connected with the secondary shaft of the transmission by means of a special clutch, together with sprockets and chain. The winch is used to pull heavy, lead-covered, underground cables through manholes. The throw-out lever is connected with the small clutch on the chassis and is located just at the back of the seat, within convenient reach of the truck driver. The cable drum is 9" in diameter, carried on a 2¼" shaft. It has a capacity of 1,000 ft. of 1½" steel cable, and is geared to a speed of 75 cable feet per minute. This winch has a pulling capacity of 4,000 pounds on a straight pull. The weight of the winch equipment is about 950 pounds.

The efficiency of this equipment and this Federal has been much praised by the fire department officials in charge of the work.

The Detroit police department signal bureau recently purchased a new model Federal 3½-ton, also equipped with a winch similar to the fire department job.

The truck is made by the Federal Motor Truck Company, Detroit, Mich.

DUPLEX HOOK AND LADDER TRUCK.

Recently Purchased by City of Harrisburg.

The fire department of Harrisburg, Pa., recently installed a Duplex city service truck with full hook and ladder equipment. The normal capacity of the truck is 7,000 pounds.

The motor is a Buda, 40 horse-power, four cylinders cast en bloc, 4¼-inch bore by 5½-inch stroke. Lubrication is by plunger oil pump to main bearings and timing gears and constant level splash to cylinders. Ignition is by Eisemann high tension magneto. The carburetor is of the Schebler float feed type. The cooling system utilizes positive water circulation by gear-driven centrifugal pump, and a round vertical tube radiator.

The valves are 1⅞-inch, clear diameter, poppet type. The connecting rods are heat-treated drop forgings with 2⅛x2½-inch bearings. The crank shaft is drop forging of open hearth steel, heat-treated and ground.

The clutch is of the enclosed dry multiple disc type. The transmission is of the positive clutch type. Four speeds may be used. Silent chain drive gives choice of two reductions, 1 to 1 or 2 to 1 from all speeds obtainable in transmission. Drive is through shaft with two universal joints from engine to chain case; shaft drive with two universal joints each from chain case to front and rear axle.

A service brake located on lower chain case shaft is operated by foot pedal. The emergency brake on upper chain case shaft is operated by hand lever. Both brake bands are lined with Raybestos. Steering gear is left side irreversible worm gear type controlling front wheel by forged levers, connecting rod on left side and transverse rod at rear of front axle.

The frame is very rigid, being of special pressed channels, with gussets of boiler steel. The front and rear axles are steel forgings, 3-inch, I-beam cross-section. The front and rear springs are semi-elliptic, 3 inches wide and 41⅜ inches long. The over-all length of the chassis is 441 inches and the over-all width 70 inches. The wheel base is 262 inches. The wheels are hickory, artillery type. The tires are 36x6 inches, single solid, front and rear.

The ladder equipment carried includes one 55 and one 40-foot Pirsch patent trussed extension ladder with rope hoist, automatic locks and stay poles; one 16-foot inside extension ladder; one 28 and one 22-foot trussed wall ladders; one 25-foot trussed wall ladder carried on sides; one 16-foot wall ladder with folding hooks and one 12-foot roof ladder with folding hooks. Poles, axes, pike poles, wall pick, crow bars, hose shut-off and door opener, extinguishers, lanterns, etc. All fire equipment is supplied by the Pirsch Company.

The truck, which is shown in the accompanying illustration, is made by the Duplex Truck Company, Lansing, Mich.

INDUSTRIAL NEWS

Cast Iron Pipe.—Prices remain at the same level after the big drop on all sizes recently announced. Business, however, is dull. Quotations: Chicago, 4-inch, class B and heavier, $53.50; 6-inch, $50.50. New York, 4-inch, class B and heavier, $59.50; 6-inch,

FEDERAL MOTOR TRUCK EQUIPPED WITH WINCH FOR FIRE ALARM WORK.

$50.50. Birmingham, 4-inch, class B and heavier, $48; 6-inch, $45, class A, $1 extra, all sizes.

The American-La France Fire Engine Co., Elmira, N. Y., announces the following shipments of apparatus: Oswego, N. Y., type 45 triple combination chemical engine and hose car and type 12 combination; Seattle, Wash., type 45 pumping engine and hose car; Holland, Mich., type 12 combination with junior pump; Utica, N. Y., type 40 chemical engine; Oneida, N. Y., type 12 triple combination chemical engine and hose car; Worcester, Mass., type 12 triple combination chemical engine and hose car; No. Kingstown, R. I., type 12 triple combination chemical engine and hose car; Tenafly, N. J., two Type 12 combination chemical engines and hose cars and two type 12 triples; Bridgeport, Conn., type 12 combination service truck; Phoenixville, Pa., type 12 combination with junior pump; Billerica, Mass., type 40 combination with junior pump; New Haven, Conn., 65-ft. aerial truck; Utica, N. Y., two type 60 combination chemical engines and hose cars; Rawlins, Wyo., type 60 combination with junior pump; Utica, N. Y., type 12 combination pumping engine and hose car and type 40 combination pumping engine and hose car.

Granite Paving Block Production.—The United States Geological Survey has issued figures showing that there was a decrease in nearly 7 per cent in quantity and nearly 3 per cent in value in the sale of granite paving blocks for 1916 as compared with the preceding year. The average price per thousand, however, increased from $48.85 to $51.09. Four of the eighteen producing states only, Maryland, New Hampshire, North Carolina and Wisconsin, showed an increase in value and sales. There was a decrease in Maine owing in part to the strike in the Vinal Haven district, which kept 400 cutters idle for six weeks.

The decrease in quantity in 1916, though smaller than that in 1915, was even more general. Wisconsin's increase evidently signifies continuation of the increased demand in the Chicago and neighboring markets, but other increases during 1915 in the interior states were not maintained in 1916. The other three states showing increase in 1916 supplied the same general markets as neighboring states showing decrease, and their amount of increase was insufficient to offset the decrease. Had work continued at the average rate during that period, the New England states as a whole, and probably the entire country, would have equaled or surpassed the production in 1915. As there has been a growing recognition among city engineers and street commissions of the suitability of granite paving blocks for streets supporting heavy traffic, the decrease in quantity of paving blocks sold in 1916 appears due to a decrease in the amount of heavy traffic construction work, rather than to competition with other paving materials.

Wisconsin, which ranked second in quantity and first in value in 1915, led in both quantity and value in 1916. Maine, which ranked first in quantity in 1915, was second in both quantity and value in 1916. New Hampshire passed Massachusetts in quantity, ranking third in this respect.

The quantity and value of paving blocks sold in these and in other states producing more than 1,000,000 blocks during 1915 and 1916 were as follows:

	Number	Value
	1916	
Wisconsin	10,229,714	$577,758
Maine	10,910,032	495,327
New Hampshire	4,243,753	205,456
Massachusetts	5,580,441	283,612
North Carolina	4,024,677	191,796
Georgia	3,639,970	108,177
Minnesota	1,859,715	123,940
	Number	Value
	1915	
Wisconsin	11,005,538	$685,622
Maine	8,823,252	430,753
New Hampshire	5,486,815	247,177
Massachusetts	5,304,377	282,640
North Carolina	4,376,383	200,851
Georgia	3,168,927	105,350
Minnesota	1,292,386	85,106

The average price per thousand varied from as low as $32 in California and $33 in Georgia to $66 in Minnesota and Rhode Island. There was little geographic significance to differences in average price, other than a relatively low price for labor in the southeastern states. The principal controlling factor was apparently the ease with which the blocks could be prepared. Thus the average prices in New Hampshire ($45) and in Georgia ($33), where some of the granites are abundantly produced, were in contrast to that in Massachusetts ($53), where some of the granites are unusually hard, and with those in Wisconsin ($62) and Minnesota ($66), which are characterized by hard granites.

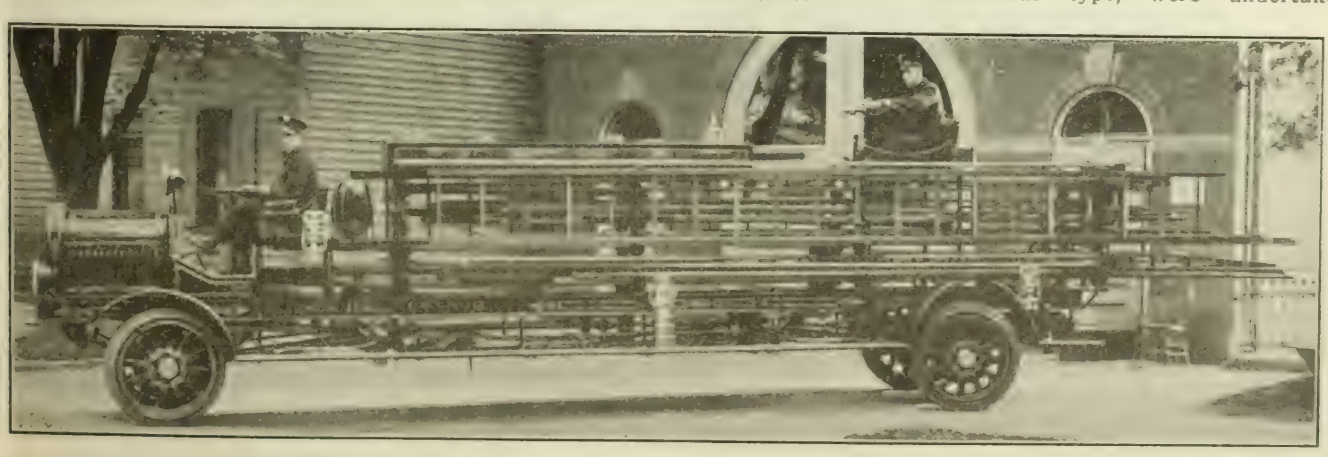
The value of sales of "durax" granite paving, reported by two producers, is not included in the foregoing figures.

Deterioration in Heating Value of Coal.

A report on the deterioration in the heating value of coal during storage, covering a five-year period, has just been issued by the Bureau of Mines, Department of the Interior, as Bulletin 136, Horace C. Porter and F. K. Ovitz being authors. The tests show that the amount of deterioration of coal in heating value during storage has commonly been overestimated. Except for the subbituminous Wyoming coal, no loss was observed in outdoor weathering greater than 1.2 per cent in the first year, or 2.1 per cent in two years. The loss in heating value is given for New River and Pittsburgh coals during five years' storage in the open air and under water, for Pocahontas during two years' storage in the air, and for Sheridan, Wyoming, coal during two and three-quarters years' storage in the air.

The tests with New River and Pittsburgh coal were made to determine the advantage to be gained by storing coal under water, and particularly under salt water. The results show that storage of New River coal under water effectively prevents deterioration of calorific value and that storage in the air under severe conditions causes only small deterioration, about one per cent in one year's exposure and about two per cent in two years. After two years the loss is continuous but slow, reaching 2.5 to 3 per cent in five years. The deterioration of Pittsburgh coal during one year's open-air storage was practically negligible. During the second, third, fourth and fifth years the deterioration proceeded very slowly and did not reach an amount greater than 1.1 per cent in five years. The submerged portions suffered no loss measurable by the degree of accuracy of the methods used.

The tests of Pocahontas coal, a semibituminous type, were undertaken



DUPLEX HOOK AND LADDER TRUCK INSTALLED BY HARRISBURG, PA.

chiefly to determine the effect on an outdoor pile of 100 tons of run-of-mine coal. During two years' outdoor exposure this coal deteriorated less than one per cent in heating value.

The Sheridan, Wyoming, subbituminous coal, known also as "black lignite," is commonly supposed to deteriorate rapidly in storage, especially by "slacking" or crumbling of the lumps. Under the conditions of the tests this coal lost 3 to 5.5 per cent of its heat value in two and three-fourths years' storage, the greater part of this loss being in the first nine months. In general, the lumps became badly cracked, but retained their form sufficiently to permit ready access of air. However, they were weakened so that they broke up badly on handling. By the use of bins with air tight bottoms and sides and a protecting layer of fine slack on the surface, the deterioration of Sheridan coal in heat value can probably be kept below 3 per cent in one year and the physical deterioration can also be largely prevented in the under portions of the pile.

The results show that the amount of deterioration of coal in heating value during storage has commonly been overestimated. With coal such as New River and Pittsburgh the expense of underwater storage equipment is not justified except as a preventive of fires from spontaneous combustion.

Detailed results and a full account of the tests and analytical data are given in the bulletin, which may be obtained free of charge by addressing the Director of the Bureau of Mines, Washington, D. C.

Walter A. Zelnicker Supply Co., St. Louis, Mo., recently issued Bulletin 226 with the title "Not That We Want to Boast—but . . ." featuring "12 acres full of material" in striking pictures. Some typical Zelnicker bargains were listed.

The Duplex Truck Company, Lansing, Mich., through R. M. Lee, president, announces that Herman Loeffler has become a member of the Duplex sales department and will represent the company in the Eastern States. Mr. Loeffler was connected with the Fairbanks-Morse Company for ten years, and for the last three years has been associated with the Novo Engine Company of Lansing.

"Saving Dollars on Truck Tires" is the suggestive title of a new series of truck tire conservation bulletins, now being offered by the **Goodyear Tire & Rubber Company,** Akron, Ohio, to owners and drivers of motor trucks operating on solid tires. A rapidly increasing number of pneumatic tire users are coming to appreciate the practical benefits of tire care and are making an honest effort to get from the tire all the mileage built into it at the factory. But, unfortunately, a considerable army of motor truck operators has come to regard solid tires as simply so much rubber fastened to the wheel, overloking that solids are built to fill a definite need just as pneumatics are, and therefore subjecting them to abuses that tires were never intended to withstand. The new Goodyear bulletins point out in a definite and positive manner the effects of such tire abuses as overloading, speeding, driving in car tracks and on rough roads, neglected cuts, improper use of non-skid devices and wheel irregularities. They come in a set of eight separate bulletins, each treating some particular form of abuse that is costing many miles of tire service.

They set forth that first of all the tire must be adapted to the conditions under which it must perform, and show that the driver, after all, is the most important factor in the matter of obtaining satisfactory mileage, next to the tire itself. A careful driver can save a big part of his salary for his employers by giving his tires proper attention. It depends on him whether the truck shall take a short cut through a rough unpaved alley or go around a block farther on smooth asphalt.

Special attention is called to the disastrous effects of overloading, which is the most common abuse that tires are subjected to. Every motor truck is rated at a certain capacity by its manufacture, generally represented in tons, and when loaded beyond this capacity both tires and truck are overloaded. And the biggest expense is soon found in increased tire bills.

The new bulletins contain no sales talk—they are simply designed to help all users of solid truck tires, no matter what make of tires they may be using. The series of eight bulletins may be secured free by addressing the company.

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

New WATERWORKS machinery is to be installed by Chapleau, Ont. Specifications were prepared by Chipman & Power.

Brainerd, Minn., is to spend $150,000 in improving its WATERWORKS. The city has retained as consulting engineer L. P. Wolff.

Newton, Kans., is to build a SEWAGE DISPOSAL PLANT. The engineers engaged to prepare plans and specifications are the firm of Black & Veatch.

Arma, Kan., is to improve its WATERWORKS. Preliminary plans for the work have been prepared by Albert C. Moore.

Ida Grove, Ia., is to improve about thirty blocks of STREETS. The plans and specifications for the work were drawn by K. C. Gaynor.

A SEWERAGE SYSTEM is contemplated by Blair, Neb. The city has retained to investigate and report on the improvement the Henningson Engineering Company.

WATERWORKS and a SEWERAGE SYSTEM are to be built by Benson, N C. The engineer for the improvements is Gilbert C. White.

Bancroft, Neb., is to install an ELECTRIC LIGHTING SYSTEM. The engineers for the improvement are the Electric Development Company.

Leaksville, N. C., is proposing the construction of a SEWERAGE SYSTEM and WATERWORKS. The consulting engineer for the work is J. N. Ambler

An ELECTRIC LIGHT PLANT is proposed for Johnstown, Neb. The engineers for the improvement are Bruce & Standeven.

Sac City, Ia., is to construct a municipal ELECTRIC LIGHT PLANT. The engineering work for the improvement has been placed in the hands of G. L. Long.

A municipal ELECTRIC LIGHT PLANT is to be built by Millstadt, Ill. Plans and specifications for the improvement are in the course of preparation by the Fuller-Coult Engineering Company.

NEWS OF THE SOCIETIES

(Continued from page 475.)

partly from driven wells and partly from the river there, filtering it before sending it into thec amp's mains. The pipe was placed three feet under ground. Not a death occurred, during the period of time the camp has been under construction, from malaria or typhoid.

PERSONALS

Allen, Herman C., of Wallace, Ida., has been named as state highway engineer to fill the vacancy caused by the resignation of E. M. Booth, who has received a commissio- in the Federal service.

Ferrier, Francis, former mayor of Berkeley, Cal., died Oct. 11, after a brief illness. He was a native of Ontario, Canada, and was 66 years old.

Hodgins, W. D., mayor of Winona, Minn., died Oct. 15, after a lingering illness. He was 56 years of age, and had served several terms as alderman and as mayor during the previous term. Julius H. Protz, president of the city council, becomes acting mayor.

Wagner, Gerald T., is now city engineer of Grand Rapids, Mich., in the place of W. S. Moore who has been appointed chief engineer of the Indiana state highway department.

Municipal Journal

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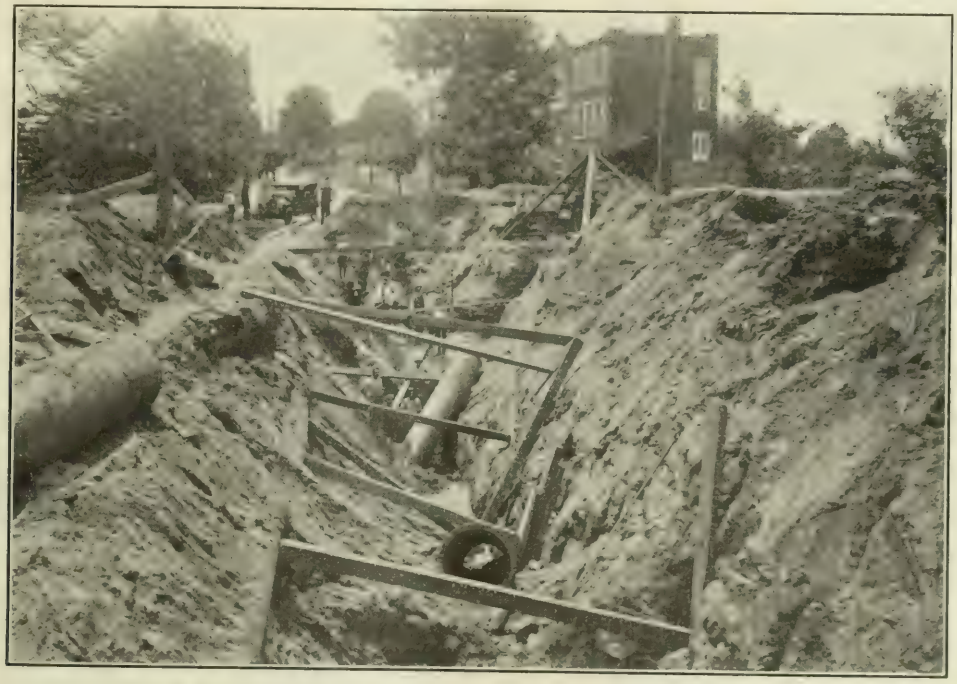
LAYING IRON PIPE SEWER IN WHITE PLAINS.

Twenty-four-Inch Cast Iron Pipe Used Because of Ground Water—Trench Eight to Eighteen Feet Deep Dug With An Excavator, No Sheeting Being Used—Tunneling Under Railroad.

By CARL P. ABBOTT.*

The city of White Plains, N. Y., is constructing a trunk sewer about 2½ miles long which will connect a valley running through the easterly portion of the city with the Bronx valley sewer where it passes through the northern section of the city. (The Bronx valley sewer receives and conducts to the Hudson river the sewage from all the communities in the valley.) A contract has been let for the first mile of this trunk sewer, and of this one-half mile is nearly completed and it is expected that the remaining half will be constructed next year. This section (which is that nearest to the Bronx valley sewer and forms the northern end of the trunk sewer) receives the flow from the Lenox avenue and Clinton street laterals and ultimately will be carried south and connect with the Westchester avenue sewage pumping station, thus relieving the main sewers through the center of the city of a part of their present burden. A part of the right of way is across private property, and it was thought advisable to acquire a sufficient width of property to provide a street along the line of the sewer. This will furnish another and much-needed north and south thoroughfare on the east side of White Plains, where at present there is only one thoroughfare.



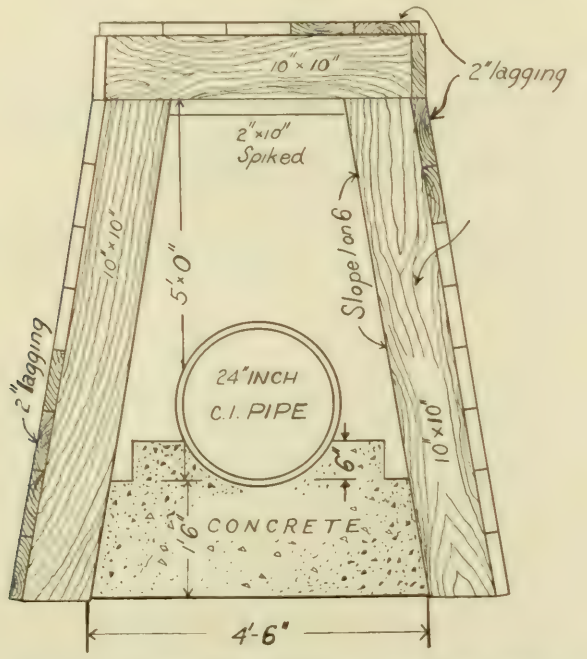
VIEW OF TRENCH, LOOKING FROM TRENCHING MACHINE.

The section of the trunk sewer included in this year's contract, about 2,700 feet, is all 24-inch cast-iron pipe, this material being decided upon because the sewer was laid in very wet ground at a considerable depth. Fortunately the city was not required to purchase the pipe, which at present prices would have involved a considerable outlay, but used iron pipe which had been used as a sewer in another part of the city and was discontinued because construction of the Bronx Parkway had rendered it unnecessary. This pipe also had been laid at considerable depth and in wet soil, and removing it required excavation, melting out lead joints, removing the pipe from the trench and refilling the trench. The pipe was then hauled between two and three miles from its old location to the point where it was to be used. The removal and carting of the pipe was all done by the contractor who laid the trunk sewer, the price bid per lineal foot of sewer including the removal and carting of the pipe as well as the excavating for, laying and backfilling of the new sewer. In removing the old lead joints the contractor used a small oxy-acetylene torch for melting the joints and this work proceeded very rapidly. In relaying the pipes in the new sewer the joints were all run with leadite, which the contractor found would be much cheaper than if lead were used.

The half-mile of work which is now nearing comple-

*Deputy Commissioner of Public Works, White Plains, N. Y.

tion consists of excavation in hardpan and a mixture of sand and clay, the depth ranging from 8 ft. to 18 ft., except that where the line passes under the tracks of the New York Central R. R. a tunnel about 150 ft. long is



PLAN OF TUNNEL LINING AND SETTING PIPE.
Bents spaced 4 ft. centers. Railroad Co. to determine amount of concrete used in case of bad bottom.

necessary. Just beyond the railroad is the Bronx valley sewer, into which this trunk sewer discharges. The Bronx valley sewer is about 25 ft. below the grade of the railroad tracks at this point, and the trunk sewer is carried under the railroad at approximately this depth, which makes the construction somewhat easier than if the depth had been less; since the deep tunnel construction is considerably easier than open cut under the railroad tracks. The material which is being tunneled through (about 30 ft. of the tunnel has now been excavated) makes the work difficult, since it is composed of large pieces of rock excavated in the construction of the Grand Central Station in New York, which was dumped on the site and is mixed and covered with cinders and loose dirt. Poling boards are being used in driving the tunnel and it is anticipated that they will be used for the entire length. The accompanying drawing shows the design finally approved by the railroad company, which is changed slightly from that originally proposed in order to make it conform with the railroad requirements.

The grade of the sewer is far below the water table throughout almost the entire length of the sewer and water was accordingly found in the trench at all points.

The engineers of the public works department had expected that construction would be carried on with the usual sheeted trench, and the contract provided for a payment of $45 per thousand for lumber left in the trench. The contractor, however, decided to excavate the trench in open cut without bracing, using a Keystone excavator for that purpose. This method has been carried out very successfully and economically. The excavator digs the trench without difficulty to within about one foot of the invert grade, even at the deepest portions of the sewer. The shovel works backward, excavating the trench behind it. The excavating is done overhand with the bucket turned around, the material being deposited along both sides of the trench. The sides of the trench are allowed to assume their natural slope, which is about 1:1, and no sheeting is used, although occasional braces are employed for holding up the top of the bank. Bracing was rendered especially necessary by the presence along one side of a part of the trench of a water main, as is shown in one of the illustrations. The contractor was fortunate in preventing the falling of this main into the trench with the consequent flooding of the trench; but he was not able to entirely prevent movement of the pipe, and after the trench had been filled it was found necessary to cut off this stretch of water main at the two ends of the section and remove it back into straight alignment.

After the excavator had dug the trench to within about a foot of the bottom, this remaining distance was taken out by hand, a length of bottom sufficient for laying one length of pipe being completed, this pipe laid to grade and the joint run, and the next 12-ft. length of trench excavated by hand, the dirt therefrom being cast back upon the length just laid. Following the laying of the main, the trench was back-filled by hand, the men so employed being used also for laying each succeeding length of pipe as the bottom was prepared for it. In all about 8 men were employed in the trench, in addition to two men who operated the excavator.

No provision was made for house connections to this trunk sewer, but another lateral sewer of ordinary sewer pipe will be provided for local service.

The contract price for digging up the 12-inch iron pipe, hauling it two or three miles, and laying it, including excavation and back-filling, was $7.60 a foot. The price for the tunnel was $57.20 per lineal foot, this including the securing and laying of the pipe as well as the excavation. There is a price of $2 for rock, but so far no rock has been encountered. Manholes were contracted for at a uniform price of $70 each. The contractor for the work was E. L. Erbeck, of White Plains. Plans were prepared by and the work is under the supervision of the department of public works of the city, of which Miguel L. Hauck is commissioner.

VIEW OF TRENCH, LOOKING TOWARD EXCAVATOR.

CITY PLANNING IN PASADENA

Progress Report of City Planning Committee—Balloting on Proposed Improvements—Municipal Railroad, Library, City Hall, Street Widening, Etc.

The City Planning Committee of Pasadena, Cal., was appointed in March, 1915, and a few weeks ago submitted its fifth detailed report of progress. It has been the aim of the committee (and probably these periodical reports are in line with such aim) to develop the popular sentiment as it goes, so that its final report when presented will find the citizens educated to an appreciation and, they hope, an acceptance of its recommendations. Among other features of this public education, it has asked the citizens to submit suggestions for improvements, and over 100 separate suggestions so made have been considered by the committee.

During the two years and a little over that the committee has been operating, it has made a complete physical survey of the city and has a series of maps and charts prepared to answer any question in regard to the topography, street lay-out, drainage, sewerage, paving, public lands, tree planting, water system, location of public buildings, transit lines, grade crossings, fire zones, apartments and hotels, churches, schools, play-grounds, parks, etc. It also has a complete set of charts showing the financial condition of the city, including its assets, its bonded indebtedness, its tax rates for a number of years past, and the actual amount raised by local taxation, the assessed value of both land and improvements, and the expenditures for maintenance and outlay in various departments. Much of this information has been shown on a basis of percentage to indicate growth, and sometimes the data have been reduced to a per capita standard to enable a comparison to be made with the corresponding figures from other cities. The committee is therefore in a position to know both what the city has at present and what it can afford in the future—two very important fundamentals of the preparation of an intelligent city plan.

The committee has endeavored to secure, by means of a straw vote or ballot, the consensus of public opinion as to the relative importance of the various proposed city planning projects. In the first balloting, 1,000 votes were cast to indicate the preference of the voters between various improvements. 10,000 points was the highest possible score, and the number of points varied from 5,687 for a new library and branches, to 2,656 for a union terminal, rapid transit to Los Angeles and the widening of Colorado street coming second and third in the list.

Some months later, in March of this year, a post card ballot was mailed to each of the 20,000 voters, and 6,330 of these were returned. Of these, 2,327 were for a municipal railroad, 1,653 for a new library, 441 for an auditorium, 397 for a civic center, 386 for widening Colorado street, 331 for Arroyo Seco Park, 267 for a new City Hall and 528 miscellaneous.

The civic planning committee is not in favor of doing "only one thing at a time." While recognizing that some improvements are more pressing than others, it believes that groups of citizens can take an interest in separate projects, working continuously on each enterprise and then, by cooperation through the City Planning Committee acting as a clearing house, the various parts of the general plan can be coordinated consistently.

Over 8,000 visitors examined an exhibit entitled "My City," during a period of eight weeks. In this exhibit were photographs of the best civic improvements and also a "Slam Corner," showing the result of a photographic contest which exhibited some things in the city that were not so attractive. "Some of these blights have been removed, some—unfortunately—still remain, while others even now are being constructed."

A comprehensive plan for Pasadena is now in course of completion and is ready for a full discussion. This provides for improvements in transportation, parks and play-grounds, street system and civic center. Under the first head, all grade crossings on the trans-continental steam lines are scheduled to be eliminated. The industrial district is to be confined within certain limits and a terminal therein to be used jointly by all the steam roads. A high-speed double-track electric line to Los Angeles would be constructed terminating at this industrial district.

The striking feature of the park system will be 38 square miles of mountain area which includes Pasadena's water shed. Small parks are to be provided for each neighborhood and advantage is to be taken of the purchases of sites for four intermediate schools to secure sufficient ground for playground centers, branch library sites and social centers. The water-ways are to be utilized as natural parkways, using these diagonals throughout the city to maintain a contact with nature without a large expenditure. Odd-shaped pieces of land, sometimes called "remnants," are to be used as breathing spaces and beauty spots.

In connection with improvements of the street system, the committee has shown upon a map a rather surprising condition of land values, in that, within 1,000 feet of a piece of land valued at $1,000 per front foot will be found other land valued at only $50. The reason is lack of access to the cheaper land, and the condition illustrates quite forcibly the importance of a consistent street system.

The committee believes that the citizens are not ready at the present time, under war conditions, to take any actual steps toward a civic center, although a new library, new city hall and municipal auditorium are among the buildings for which some demand is indicated, and which should be planned to form a part of a civic center.

Pasadena lies within a basin of about 60 square miles in which also are located Altadena, So. Pasadena, San Marino, San Gabriel, and Alhambra. The automobile and good roads make this whole district a unit topographically, and the committee makes a plea for "neighborly development into one unified community." "We now have 60,000 people in the valley and it will be a comparatively short time when this district will furnish homes for 100,000 inhabitants. Let it be not a city in the generally accepted sense, but a great living district, so attractive in all its parts that the next 60,000 people to follow the 60,000 already here will be attracted to this community because it will be the best place in all the world in which to work and to live and to play."

STIMULATING DOMESTIC USE OF ELECTRICITY.

The municipal Electric Department of London, Ont., two or three years ago introduced the scheme of wiring houses on the installment plan. Eighty-three houses were so wired in 1915 and 115 houses in 1916. As a number of complaints were received regarding the prices which were being charged by local contractors for wiring, a specification and detailed schedule of material was prepared so that prospective customers might obtain bids from several contractors, on which the department would make recommendations to the customers. The general manager of the department, E. V. Buchanan, stated in

his latest report that if this plan did not result in obtaining fairer prices for the citizens, a regular wiring force would be organized by the department.

Electric cooking is reported to have proved a complete success as to both economy and excellence of the food cooked. Last year 225 electric cooking ranges were sold by the department and about 300 were in use in the city. The excess of the average electric bill over the ordinary lighting bill, which is believed to represent the electric cooking bill, was $1.65 a month. In addition to the cooking ranges, the department sold more than 3,000 other electric appliances, about half of which were electric irons.

NEW YORK BUREAU OF FIRE PREVENTION*

Work Done by the Electrical Division, Division of Examiners, Division of Plan Room, and Recording Division—Education and Propaganda.

By ROBERT ADAMSON†

Electrical Division.—The Fire Commissioner is empowered to require the removal of fire hazards due to defective electrical conditions, and to order the installation of interior fire alarm systems in hotels, lodging houses, public and private hospitals or asylums, department stores, etc., and the installation of means of communicating alarms of fire to Fire Headquarters in similar classes of buildings. These may be sprinkler alarms, water alarms, automatic thermostatic alarms, or others. The bulk of this work is in the hands of the Electrical Division, which also makes inspections of electrical safety devices, such as those for elevator doors, of electrical pumps for volatile inflammable liquids, etc.

It is to be noted, however, that the supervision over electrical fire hazards is also in the hands of the Department of Water Supply, Gas & Electricity, so that conditions in the ordinary building are generally reported to that department in order to avoid duplication of inspection. The Fire Department retains jurisdiction over the protection of motors against sparking near volatile inflammable liquids and the protection of electric light bulbs under similar conditions.

Electrical inspectors are certified to the department from appropriate civil service lists and are usually men with electrical training but without special training with fire alarm signals. The new inspector receives this training in the department by assisting senior inspectors in testing alarm systems and by instruction in the electrical laboratory. When any new device is recommended for approval, it is carefully explained in a lecture before all inspectors, who make suggestions and criticisms.

Prior to the issuance of orders for the installation of a fire alarm signal system, the inspector visits the premises for the purpose of making a survey known to the trade as a "lay out." This contains all the information necessary for the owner to obtain estimates for the installation of the system. The layout is furnished to the owner free, and saves him architect's or contractor's fees for the preparing of a plan. It also eliminates checking up several contractors' plans for the same building at Fire Headquarters, necessary under the old system.

When the system is installed, an inspector is sent to test out each individual gong and station in the installation, as well as to examine carefully control boards, conduit, wire, connections, etc. The entire system must be subjected to exhaustive scrutiny. Similar tests and examinations are made of systems connecting with headquarters. On sprinkler electrical inspections, the inspector tests the water-flow alarm, the high and low water indicating devices in connection with pressure tanks, as well as the conduit, wire work, etc.

The inspection of electrical wiring and equipment in hazardous risks involves a knowledge of the electrical code and in addition a knowledge of the properties of the gases or liquids involved in the risk.

The Electrical Laboratory is maintained for the purpose of testing the various fire protective or preventive devices of an electrical nature. It makes elaborate tests for inspectors which would be impossible in the field and also assists owners and contractors in cases where special treatment is involved. It acts, in addition, as test agent for the Industrial Commission of the State Labor Department.

During 1916, 1,168 interior fire alarm signal systems were installed in buildings in New York City by order of the Fire Department, a greater number than in any previous year. There were at the end of 1916, 1,738 approved systems in the city, almost all installed under this administration. Of these, 1,366 were in factory buildings, where the Fire Commissioner is required to order the installation under the mandatory provisions of the Labor Law. Of the 1,738 systems, only 23, or 1.3 per cent, were reported out of order at any time last year, and the majority of these were repaired by the inspector before he left the building.

Examining Reports and Issuing Orders.—The Division of Examiners receives reports and recommendations from inspectors and uniformed firemen and on the basis of these reports determines the necessity for orders to correct the violations recorded. All orders are carefully checked up with the reports before issuance. The division advises owners of the most economical method of complying with the law, and points out alternative methods in many cases.

The examiners are fire prevention inspectors or assistant engineers and are put though a special training to make them thoroughly familiar with the exacting requirements of the work. Under the present reorganzed form of the division, there are two separate groups of examiners, one of which handles violations of the fire prevention laws and the other violations of the Labor Law.

Division of the Plan Room.—This division receives plans filed for buildings containing a combustible occupancy and plans for sprinkler and standpipe installations. In the former case, the plans must be approved by the Division of the Plan Room before a permit is issued by the Division of Combustibles. In the latter case, the plans must be approved before the sprinkler or standpipe system is installed. In examining combustible occupancy plans, the division goes into details regarding the installation of containers for combustible liquids in large quantities, such as oil and gasoline, and into such matters as the construction of vaults for nitro-cellulose products, including motion picture films.

Handling of Records and Correspondence.—The Recording Division of the Bureau of Fire Prevention has in its files in the main office approximately 150,000 active folders against premises; 12,000 folders a day go over the desk of the recording clerk in process of transferrence; and about 300 letters are received each day.

For each address there is an owner's folder, containing orders and correspondence relating to the owner; and one or more occupant's folders. These are numbered and filed under record number. The folders are routed through the department by an endorsement sheet system. The endorsement sheet, filed on top of the papers, shows the name of the endorser, the person to whom the papers are to go, and the recommendation of the endorser. This sheet serves as a permanent record of the travels of the

*Concluded from page 447.
†Fire Commissioner, City of New York.

folder. The outside of the folder has a similar record, abridged for the messenger, who travels the rounds of the department four times a day. Each division in the bureau has a number and each division head a letter, for routing purposes.

A record is made at the charging desk of the destination of each folder before it is sent out. This is on a master record card, of which there is one for each address. By referring to the master record card, it is possible to determine where any folder is or was at any given date. The master record cards are filed under addresses.

The tickler system contains the folders on which replies are to be received. There is also a fifteen-day tickler system for all orders issued which mechanically insures their receiving proper attention; and a thirty-day tickler system for combustible permits. A separate synoptical record is kept of every order on a folder. This record makes a history of the case for reference in case a folder is misplaced. Separate copies of orders are also kept to be used by inspectors in making reinspections.

The Stenographic Division at present employs twenty-two typists and sends out about 250 letters and 80 orders a day. Mechanical methods of dictation are employed in the bureau, and this division handles daily about 30 cylinders recevied from twelve dictating machines.

Education and Propaganda.—In addition to the above activities, the Bureau of Fire Prevention has engaged in educational and propaganda work to a large extent. Statistical study shows that fully three-fourth of our fires, with the accompanying loss of life, invariably occur year after year where people live—in tenements, dwellings, and furnished room and boarding houses. The fire commissioner has little authority to enforce adequate preventive and protective measures in these buildings. In the absence of a system such as prevails in some European countries of holding tenants legally responsible for fire losses occuring on their premises unless it can be proven that the fire was not due to individual carelessness, we in this country can only endeavor to teach people to prevent fires. This is the reason for our constant efforts in the direction of education; efforts that must bear fruit more in the next generation than in this.

We have directed a great deal of attention to the children as the most likely element of the population to bring about a change in the future. "Fire Prevention Lessons," an illustrated pamphlet prepared under my direction, has been adopted by the Board of Education and is used as a text book throughout New York's public schools. The book has also been used as a basis for similar work in other cities throughout the country. As far as our facilities permit, we also maintain a lecture service and give illustrated talks on fire prevention to large public school audiences. Our collection of lantern slides on this subject is excellent; and we have in addition a three-reel motion picture drama, "The Locked Door," prepared under my direction. Each year thousands of "Fire Prevention Don'ts" pamphlets that we have had printed in English and in Yiddish, are distributed to audiences of both children and adults. We have lately secured the cooperation of charity organizations, settlements, and neighborhood associations in this work. We have erected one large fire prevention bill-board in a prominent location and hope to add more. The public press we have found most ready to cooperate in spreading fire prevention propaganda by means of timely stories and warnings. On Fire Prevention Day, October 9 of each year, we distribute thousands of posters and circulars throughout the city, hold a parade of illustrative floats, and engage in every form of propagandist activity that our ingenuity has been able to devise.

Our hope is that when the present generation of children grows up, they will have the simple lesson of preventing careless fires so thoroughly drilled into their habits of thought and action that they will make a far better record than the present generation of their elders.

ANOTHER LIBERTY BOND CITY.

Editor of Municipal Journal,
243 West 39th St., New York City.

Dear Sir:

In your issue of October 18th I noticed where Boston bought $1,000,000 worth of Liberty Bonds. The citizens of that community ought to be congratulated on having officials with courage enough to back up good judgment. I consider that our Liberty Bonds are as good an investment as we can make, so we are simply making a good investment for our city when we purchase Liberty Bonds. But aside from that, at the present time it is our duty to put our money, or those of us who handle our citizens' money, into these bonds so that we might back up our government and our boys who are fighting for their country.

I am proud to say that our little city did the best we could to help our government by taking $10,000 on the first loan and $10,000 on the second loan. Had we been able to have taken more we would have done so. Considering the size of our city (14,000 population) I believe that we have done our share to help the cause.

Yours very truly,

J. B. MARMION.

Mayor, City of Houston Heights, Texas.

SPOOL ROLLER FOR CONCRETE PAVEMENTS.

Quite recently the first trial was made on the Pemberton-Lewiston road, New Jersey (see Municipal Journal for October 25th) of a new device for rolling the surface of concrete roads. This is called by the inventor a "Spool Roller," owing to its shape. The roll used in this test was a piece of wood turned from a piece of 8 by 8 yellow pine 19 ft. long over all and 4 inches less in diameter at the middle than at the two ends, the longitudinal section showing two arcs of circles each with a rise of two inches from its cord, thus giving a 2-inch crown to the 18-ft. roadway. At each end of the roller is left a dowel 4 inches in diameter and 6 inches long. Over each dowel is slipped a ring formed on the end of an iron rod used as a handle for pulling the roller. The two ends of the roller ride upon the side forms of the road. When drawn forward, the roller compresses the concrete and pushes ahead the surplus water and more or less semi-liquid mortar. This roller was devised by Frank Yocum, inspector of this road for the Portland Cement Association, to which association it was assigned. Mr. Yocum says that its chief purpose is to give a more compact and uniformly dense concrete and a true crown to the surface, but that it also saves labor in the surfacing of the concrete.

SPOOL ROLLER IN POSITION, RESTING UPON THE SIDE FORMS.

This is the latest of several devices for finishing concrete road surfaces which have been tried out during the past year or two, these including the use of long straight rollers worked from the shoulders of the rod by means of long handles; lengths of hose, which are drawn over the surface; hinged board templets (described elsewhere in this issue), and one or two others which have been described in Municipal Journal during the past few months.

BOARD FLOAT FOR FINISHING CONCRETE STREETS.

In placing a two-course concrete pavement on 11th Street, Wichita Falls, Tex., a novel method of finishing was employed which gave most excellent results.

Two 1 by 6-inch boards, each equal in length to one-half the width of the pavement, were spliced so as to make a jointed plank, the length of which was equal to the width of the street. At each end of this was nailed a short piece of 2-inch stock so notched that the outer end rested on the curb and the bottom of the float was at

FINISHING WICHITA FALLS STREET WITH HINGED BOARD FLOAT.

the gutter grade. A hole was bored near the lower end of this at an angle of about 30 degrees. Wooden handles were inserted, as shown in the picture. A man at each end then pushed and pulled the float over the pavement, finishing in one operation the whole width of the street, the float being drawn across the surface as many times as was necessary to obtain the required evenness.

This process eliminated much of the excess water and gave an even surface, but one not as gritty as that produced by the belt finish.—*Concrete Highway Magazine.*

HANDLING EXPLOSIVES.

After November 15, any person in the United States found with explosives in his possession and who does not have a license issued by the Federal Government showing the purpose for which the explosives are to be used, will be arrested and may be fined $5,000 or imprisoned for one year, or both. This announcement is of interest to city officials, since under the law the director of the Bureau of Mines is empowered to utilize the services of city police and all officials in any way charged with police duties to assist in the enforcement of the law.

The police of the cities of the country have already been organized for this work, headed by a commission of chiefs of police in the large cities, of which commission Major R. W. Pullman, Superintendent of Police of Washington, D. C., is chairman. The police are not only to look after the enforcement of the law, but are also to make thorough investigations of all dynamite outrages and fires in factories and warehouses, and report to the director of the Bureau of Mines. In addition to the city police, the director can also call upon state police, county sheriffs, deputies, constables, etc.

Under the law everyone who handles explosives must have a license. Manufacturers, importers and exporters must obtain federal licenses from the Bureau in Washington. Sellers and purchasers of explosives can obtain licenses from county clerks or other local officers authorized to administer oaths. Where the state law provides for issuing such licenses, the state officials authorized to issue them will be designated as federal licensing agents, and the same will be true of city officials authorized to issue such explosive licenses. Contractors and others using large quantities of explosives which are handled by employees may issue explosives only through an employee holding a license called a foreman's license. Only the citizens of the United States, or of countries friendly to the United States and the Allies, may obtain licenses.

ILLINOIS HIGHWAY BONDING PLAN.

The sixth annual meeting of the Illinois State Highway Improvement Association fired the opening gun of a campaign for votes for the proposition to issue $60,000,000 of state bonds, which will come before the people for their decision in November, 1918.

The law submitting the proposition to vote was passed by the Legislature at its last session, together with others providing the means for paying the principal and interest of these bonds. In 1918 the automobile licenses will be increased 50 per cent and in 1920 by an equal addition, so that a small automobile now paying $4 will pay $6 a year after 1918 and $8 after 1920. The present automobile fees are used in road maintenance and the same amounts from the new fees will continue to be so used, the additions to the fees being set aside for payment of interest and principal of the $60,000,000 bond issue.

The bonds will be issued as they are required from year to year, and in the serial form now becoming popular, especially when the bonds are issued to pay for public improvements which have a more or less definite life, a fixed amount coming due each year until the whole amount is paid. It is proposed to fix the maximum limit of the loan at 20 years, which, if all were issued at once, would cause them to be paid at the rate of $3,000,000 a year. But as they are to be issued each year in the amounts needed, the period of issue will be extended over possibly ten years, and so the period required for payment of the last of the bonds may be extended to 30 years, or even more, beyond the time of issuing the first of the bonds. The bonds of each annual series of $6,000,000 (if they are issued uniformly at that rate) would be repaid at the rate of $300,000 a year, and at the end of ten years the annual repayment of bonds would amount to $3,000,000 a year, with a maximum payment of interest at 4 per cent, of $1,860,000 a year. A very conservative estimate places the increase in income from automobile licenses at 10 per cent a year, this being very much less than the annual increases heretofore. Even this conservative increase in automobile license income places the project in the class of safe investments, with a few millions to give the repayment fund a good start, to be derived from the automobile fund from the beginning of 1918 until the date of the first repayment arrives, which will probably be three or four years. And

after 12 or 15 years the excess of the automobile license fund each year, over payments of principal and interest, will be sufficient to extend the amount of work to be done or to increase the appropriation for maintenance.

Illinois claims the invention of this method of raising the funds for building good roads, which has now been adopted or is under discussion by other states.

MAINTENANCE AND REPAIR OF IMPROVED ROADS

Brick Pavements, Bituminous Surfaced Concrete and Bituminous Macadam—Patrol System of Maintenance—Lessons from Ohio's Experimental Road.

By CHAS. C. BROWN.

This article follows in series an article in Municipal Journal in the number for September 13th, 1917, on the "Maintenance of Concrete Pavements," and is concerned with roads of the more permanent forms of construction, and does not touch macadam or gravel roads except as they are given more permanent surfaces in the process of maintaining them. Thus it is a common practice in Ohio to construct water-bound macadam roads according to a high-class specification and after a year or two of wear to give them a treatment with tar or asphalt, which materially improves the surface and promotes it to a higher class. This is but a variation of the best practice in constructing bituminous macadam roads by the penetration method.

BRICK PAVEMENTS.

Maintenance and repair expense on brick roads in country districts is on the whole so slight that it is scarcely necessary to prescribe methods for doing the work. The failures are so local and so definitely due to local conditions that the repairs must in any event be made by methods devised specially to fit the individual cases. This is indicated by the results of a recent inspection (August, 1917) of a test road built for the Ohio State Highway Deparment in 1912 and 1913, using several different kinds of bricks and several different methods of construction. These results may be classified as follows:

Fifteen sections of the pavement were laid with 4-inch, 1:3:6 gravel, concrete base and 2-inch sand cushion. One section was laid with 2-inch sand cushion on the natural clay sub-grade, well rolled with a 10-ton roller. The sand cushion was in all cases smooth, being leveled with a templet both before and after being uniformly compacted by rolling with a hand roller. In the first fifteen sections there are no difficulties traceable to the foundation. The sixteenth section is in very bad condition, some of it having settled irregularly, and some of it with almost regularly alternate bricks settled more than those adjoining. All the grout-filled joints are broken up except an area along one curb 1 to 2 ft. wide, and the bricks are broken and spoiled. It is evident that the only permanent repair needed in the pavement on account of the foundation is the construction of a permanent foundation under this 16th section, followed by a relaying of the bricks, with replacement of those too seriously broken to be used again.

Concrete curb, 5 by 10 by 15 inches, borders all sections except the east side of the 16th, which has an 8 by 8-inch curb put in after the brick had been laid and grouted. There is a 5-ft. earth berm on the west side and a 9 or 10-ft. earth drive on the east side. Apparently the curb was heavy enough to carry any pressure from expansion of the pavement as it seems to be straight and solid. Sunken curbs were placed at each end of the brick area and have been sufficient to prevent any longitudinal motion, though there are no transverse expansion joints in the 500 feet length of cement-grout filled brick. Possibly the bad condition of the bricks in section 16 without concrete foundation, which is at one end of the brick pavement, is due to its inability to withstand the stress from expansion. The 300 feet of brick pavement at the other end had either asphalt or sand filler. The width of the pavement is 16 feet and there is a ¾-in. asphalt expansion joint along each curb. This joint was not in all cases able to take up the expansion of the pavement, since along the curbs there is an occasional strip about 4 inches wide and 5 to 10 courses long which shows a crack and a crushing of brick and in two or three instances a tendency to lift next the curb. Nearly every section has one of these spots. These do not appear to be due to freezing and expansion of water under the spots, but the cracks and opened joints should be thoroughly filled with a bituminous filler which can fill them so as to prevent water reaching the sand cushion through them.

The joints in the first six sections, about 300 feet, are filled with an asphalt joint filler or with sand in alternate strips, the sand strips from 7 to 15 feet long and the asphalt strips from 30 to 50 feet long. Quite generally the sand-filled joints are not full and the edges of the brick are rounded by wear and in one section are chipped and spalled. The same can be said in less degree of the asphalt-filled joints. The indication is that the joints should be cleaned out as far down as the filler can be loosened with a sharp tool and swept out with a narrow, stiff wire broom, getting down into the joint, and then filled with a bituminous filler. The writer would recommend a mixture of sand and a rather soft asphaltic cement or tar, approximately one part by weight of each, less sand being used where it is particularly difficult to press the filler into the joints. The cement-grout joints are most of them well filled. All the sections but one are of repressed brick with rounded corners. In two or three sections there has been some pinching of the filler out of the joints, which has permitted some chipping of the brick, but these areas are very few and small. Some joints are in the shape of Fig. 1, showing that the grout has not adhered to the rounded corners of the bricks, but is strong enough to hold the projection in the center. However, this projection can be broken off very easily by sidewise pressure directly upon it. In other cases the joint was in the shape of Fig. 2, indicating that the cement is wearing faster than the brick, but is still protecting the edges. In one section there is a crack about 3 ft. long and one about 1.5 ft. long. Otherwise the pavement is quite free of breaks except in the crushed spots near the curb described above. No repairs are required to these sections and none will be required under present conditions for many years. Filling of cracks which have developed any width with tar or asphaltic mastic, as recommended for open joints, is suggested.

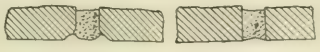


FIG. 1. FIG. 2.

When it really becomes necessary in the maintenance of a brick pavement to take up an area and relay it, the bricks should be carefully removed and chipped out so as to leave clean spaces and whole bricks, thus making it possible to join the patch intimately with the pavement with the toothing necessary to keep the bricks whole. It is common, when a sand cushion is used, to lay the patch slightly higher than the existing pavement, to allow for shrinkage of the cushion. But the full settlement allowed for seldom occurs and it is much better to consolidate the

cushion thoroughly and lay the surface of the patch at the same elevation as the existing pavement surface. The cement-sand cushion now becoming popular is particularly adapted to such patches. The filler for the joints of the patch should be the same as that in the pavement.

CONCRETE PAVEMENTS.

Several sections in the Franklin County experimental pavement were laid with concrete alone or with various sorts of surface reinforcement. In some points broken stone was used from various deposits of varying hardness, in some gravel was used and in others slag.

The plain concrete section was 457 ft. long, laid in blocks from 41 to 66 ft. long, with concrete of various mixtures from 1:1½:3 to 1:2½:4½, with stone of two degrees of hardness, and with gravel. Four of the nine blocks into which the pavement was divided by the expansion joints had longitudinal cracks. There are many small holes and one or two large ones on cracks. The concrete was not uniformly mixed and large stones show in considerable numbers in patches here and there. Maintenance has consisted in filling all holes an inch or more in diameter with bitumen as described in the preceding article of this series.

A two-course pavement 484 feet long, dry stone laid and grouted with cement and sand, wet mixture, has very uneven surface. Part of it is badly cracked, both longitudinally and transversely. Part of this cracking seems to be due to the fact that the base course in a part of the area was rolled into the soft, wet subgrade so that the mud filled the voids in the lower half of the layer. There are no expansion joints. It would seem that the only repair possible is to take up and relay the section which is cracked, correcting the errors in construction.

Three sections of concrete base were surfaced with different bituminous mixtures. In constructing one section the concrete base was covered with a 1:3 cement mortar ½ inch thick on which a 2-inch layer of 1 to 2-in. stone was placed and lightly tamped. After 10 days' setting and once rolling with a 10-ton roller, 1½ gal. per sq. yd. of asphalt binder was applied, then ½ to 1 in. stone, which was rolled, and a seal coat of ½ gal. per sq. yd. was applied and covered with limestone screenings and rolled. There was some tendency of the bituminous layer to roll during construction and the pavement surface is now very irregular, showing much tendency to roll in spots, there being no lengthy rolls except one near the south end. The bitumen is disappearing and showing the stone underneath. Patching by the addition of bitumen covered by fine stone has been done, but the surface remains very irregular. Two sections of concrete pavement were covered with thin coats of tar of different brands, but very similar characteristics. The amount of tar applied varied from 0.35 to 0.55 gal. per sq. yd., and a second coat of 0.30 to 0.35 gal. was applied to two small areas, after the first coat had been sanded and had time to set. The tar has worn off of much of both sections, the only portion intact being one which had received two coats of 0.35 gal. each. There is some further indication that the larger amounts of bitumen produced the most lasting coat, but these indications are very irregular, and much of the concrete is very nearly bare. There are very few areas of 10 square yards together without spots of bare concrete. Cracks in the concrete are most of them longitudinal and extend over more than half the length of the pavement in irregular locations. Repair can be made by treating the surface with hot tar, but the surface of the concrete is not greatly different from the plain concrete surfaces near by and may be left to the same action of traffic.

A number of sections, each about 400 feet long, were constructed of various kinds of macadam, using various materials, including asphalt macadam by penetration method, tar macadam by penetration method, water-bound macadam with Marion, Piqua and Columbus stone, water-bound macadam treated with lime, macadam treated with glutrin, all the preceding with broken limestone; also water-bound slag macadam and glutrin treated slag macadam. After four years, these varieties of construction were all repaired in the standard manner in use in Franklin county and used quite generally in Ohio State maintenance work, and the sections all received a coating of tar with stone screenings on its surface, serious irregularities in surface being removed by filling the low spots with bituminized small stone or screenings. Since this treatment, differences in the original construction must be searched for diligently in order to discover them, except that the slag sections are rougher and show more tendency toward complete destruction and doubtless require more expenditure for maintenance.

This indicates that the standard method of maintenance, properly applied, gives good results in maintaining surfaces, even to the extent of minimizing considerable differences in the quality of the original materials and methods of construction. Several specifications are used, presumably according to the necessities of the case, as follows:

Trinidad liquid asphalt A, 1/3 gal. per sq. yd., in one application;

Tarvia B, cold, 1/3 gal. per sq. yd., in one application;

Tarvia B, cold, ½ gal. per sq. yd., in two applications.

In each case a coating of stone screenings is applied after a few hours allowed for the bitumen to soak into the road surface and set.

When a road has worn so much as to require renewal, a 4-inch layer of bituminous macadam is put on, using 2½ gallons of high carbon tar, applied hot, with stone screenings on the surface, according to a standard specification.

The National road six miles west of Columbus, O., has a heavy automobile traffic, including numerous light motor trucks, as well as considerable hard-tire and horse traffic. It requires a treatment each year and some sections of the road would last longer and keep in better condition if the treatment were applied twice each year.

By the contract method of maintaining roads which is in vogue, all of a road receives treatment at the same time, and so bad places develop occasionally which rapidly spread and so hasten the time of resurfacing. Also these specially bad places do not receive the particular treatment which should be given them, and so, while they are improved, their deterioration is not stopped. The patrol system and immediate treatment of all bad spots as soon as they develop would materially improve the continuous condition of the roads. A single man with a small motor truck could cover many miles of road in a day. Possibly the patrol would cost more than the present method, even when the longer life of the road is taken into account; there are no data at hand to make the comparison. The patrol method is worth trying.

A source of waste in the present method is the excess of tar used in some places, due to more impervious surface, and the draining of tar off of the road bed at such places. More careful fitting of the amount of tar to the condition of the road would prevent this waste, but it would hardly be possible under the present wholesale treatment. Insufficient removal of the road dust before applying the tar is also an occasional source of inefficiency in treatment.

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Contributions suitable for this paper, either in the form of special articles or as letters discussing municipal matters, are invited and paid for.

City officials and civic organizations are particularly requested to send Municipal Journal regularly their annual and special reports.

Information Bureau.

Municipal Journal's Information Bureau, developed by twenty-one years' research and practical experience in its special field, is at the command of our subscribers at all times and without charge.

MUNICIPAL BONDS AND LIBERTY BONDS.

On another page will be found a letter from the mayor of a southwestern city that has purchased Liberty Bonds, in line with other and larger cities that have previously been named in these columns. Besides the cities already mentioned by Municipal Journal which have purchased Liberty Bonds with municipal funds, there are undoubtedly a considerable number of such instances which have not come to our notice. Among those of which we have learned and not already mentioned may be named Hagerstown, Md., which purchased $20,000 worth with the balances in the city treasury standing to the credit of several accounts; and the county of Schuylkill, Pa., the sinking fund commission of which county purchased $100,000 worth of the Second Liberty Bonds. Columbus, O., invested $450 of the firemen's pension fund and Chicago $2,000,000 of its traction fund in these bonds.

Although investors have put more money into Liberty Bonds this year than was ever before invested at any one time in any one country, the sale of municipal bonds has apparently not been very seriously affected thereby. It is true that during October numerous municipalities postponed bond offerings and investment dealers refrained from offering any new issues, which resulted in the sale of a little less than $22,000,000 worth of bonds in October, which is about two-thirds of the average during the past seven years, about 40 per cent as great as the sale in October, 1916, and almost double the sale in October, 1914. Taking the ten months ending October 30, however, the sale of municipal bonds in 1917 was greater than in the same period of any year except 1916, when the sale was about 2 per cent greater. Prices of municipal bonds are reported by the "Bond Buyer" to have held up well during the month and have even shown slight improvement over September quotations in the case of those issued by the larger cities; and that authority thinks it "probable that a demand for securities exempt from taxation will, between now and the opening of the third Liberty Loan offering, absorb all the new bonds that must be sold without unfavorably affecting selling values."

CONTRACTORS THE BURDEN BEARERS.

In an address before the American Road Builders' Association a few days ago, Edwin Duffey, commissioner of highways of New York State, expressed his appreciation of and sympathy with the contractors engaged in constructing highways in his state because of the unusual difficulties under which they had to labor this year. A large part of the work done this season was on contracts that had been let in 1916, before the adverse conditions as to prices and availability of both material and labor were anticipated. The result was that most of the contractors were required to pay much more for both labor and material than they had anticipated, and in addition found it extremely difficult to keep constantly on hand a sufficient amount of material and force of labor to maintain uninterrupted construction. This meant a financial loss not only because of the higher prices paid but also because the interruptions caused by the delays in delivery of materials interfered with the economical prosecution of the work.

The state highway department found the condition of affairs annoying and the delays subjected them to considerable criticism, while the removal from their force of scores of their best men for service in the army still further increased their difficulties; but Mr. Duffey realized that these troubles were not nearly so serious as those borne by the contractors, and that the latter were the real bearers of the burdens imposed by the war, so far as highway construction is concerned.

In still another way has a burden been heaped upon their shoulders, however. The contracts in New York, as probably in all states, provide that a material percentage of the contract price (that in New York State being 10 per cent) must be retained until after the entire completion of the contract. Owing to delays which were entirely beyond the control of the contractors, and added to their expenses rather than being a means of economy, a considerable percentage of the contracts which would otherwise have been completed this year must now be carried over to next year, especially since orders recently sent out from Washington prohibit the transportation by rail of any road-building materials until after the end of the road-building season. This means that this 10 per cent must be retained from the contractors during the winter and until such times as conditions next year may permit of the completion of their contracts; thus depriving the contractors of the interest on this sum and also of the use of the money for paying this year's bills for labor and material, which bills are much higher than anticipated.

As Mr. Duffey stated, the law holds the officials responsible for retaining this percentage, and until they receive legal authority to do so they cannot turn over this sum to the contractors. In England and other European countries, after the outbreak of the war, the unusual financial conditions were recognized and those upon whom they bore hardest were relieved of certain obligations by government enactment. Would it not be possible for the state governments to recognize the unusual burdens imposed upon contractors by these retained percentages and in some way to return a considerable part

of this, retaining only sufficient to insure the completion of the contracts by the contractors next year? In view of the considerable loss which many of the contractors have already sustained and the fact that in the majority of cases delay in the completion of the contract was due to causes entirely beyond their control and unforseen by them, such action on the part of the state would appear to be no more than justice to those who, as Mr. Duffey stated, have been the real bearers of the burdens this year so far as highway work is concerned.

FIREMEN'S PENSIONS AND BENEFITS

Tabulation of Data Contributed by Fire Chiefs Covering These Points—Schools of Instruction for Firemen —Building Inspection by Firemen.

The tabulated matter given below is the first installment of the third of seven tables (the first two having appeared in last week's issue) in which we are presenting information concerning about six hundred cities furnished for this purpose by the fire chiefs. The remainder of this table and the other three, which give statistics concerning the fire apparatus in service, will appear in successive issues of Municipal Journal.

TABLE NO. 3.—PENSIONS AND BENEFITS. INSTRUCTION AND INSPECTION.

City and State.	Have firemen benevolent or similar organizations?	Is there a pension fund?	What proportion does city contribute?	In case of accident, who pays the award?	What percent. is paid by city and what by association?	Is there a school or other organized instruction?	Do men inspect bldgs. to learn conditions?
Alabama							
Brewton	No	No		City		No	No.
Gadsden	Yes	No	$25	Fire dept	None	No	Yes.
Huntsville	Pay of sick or injured fireman goes on						Yes.
Selma	No	No				Yes	Yes.
Arizona							
Bisbee	No	No				Yes	Yes.
Douglas	No	No		City		No	Yes.
Phoenix	No	Volunteer	Nothing	Volunteers		Yes	Yes.
Arkansas							
Little Rock	Yes	No	None	Local organization	City pays sal'y	No	Yes.
Prescott	Yes	No				Yes	Yes.
California							
Alameda	Yes	Yes	None	Relief Association		No	Yes.
Berkeley	No	No		City under State Compensation Act		Drill tow'r	Yes.
Bishop	No	No	None			No	Yes.
Hayward	No	No		Surety Co.		No	Yes.
Modesto	Yes	No		City	65% of salary		Yes.
Monrovia	No	No		State Comp. Act		Instructed by Chief	Yes.
Palo Alto	Yes		About $500	State Comp. Act		No	Yes.
Pasadena	Yes			City pays half salary			Yes.
Petaluma	Yes	No		City			
Pomona	Volunteer	No		City pays salary		No	Yes.
Redlands	No	No		City			Yes.
Richmond	No	No		City under Comp. Act			
Santa Barbara	No	No		City under Comp. Act		No	No.
Santa Ana	No	No		City	All by city	No	Yes.
Santa Monica	Yes	No				Yes	Officers.
Stockton	No	Yes	2% of wages	City		No	Yes.
Watsonville	No	No	$500 per year to volunteers			No	Yes.
Colorado							
Colorado Springs	Yes	Yes	$1,000 yearly	City pays salary for 3 months. Pension fund all rest	All by assn.	Yes	Yes.
Grand Junction	No	Will be Jan. 1	Nothing		All by state	Yes	Yes.
Trinidad	Yes	Yes	20%	City, under State Act		Yes	
Connecticut							
Bridgeport	Yes	Yes	All	State Assoc.	All	Yes	Yes.
Danbury	Yes	No		City and State	50-50	No	Yes.
Greenwich	No	No		State assn.			
Hartford	Yes	Yes	99%	Full pay and med. att.		Yes	Yes.
New Britain	Yes	Yes	$1,000	City	City 83%, firemen 17%		Yes.
New Haven	Yes	Yes	5% of liquor licenses	City		Drill sch.	Yes.
Torrington	Yes	No	9%	Insurance Co.	All by ins. co.	Yes	Yes.
Waterbury	Yes	Yes	None	City and assn.	Full pay by city, $2 daily by assn.	No	Yes.
Wethersfield				Assn.	All by assn.	No	No.
District of Columbia							
Washington	Yes	Yes	50%	Assn.	All by assn.	No	Yes.
Florida							
Lakeland						Some drill	Yes.
St. Augustine	No	No		City		No	Yes.
St. Petersburg	No	No		City		No	Yes.
Sarasota	No	No		City		Yes	Yes.
W. Tampa	No	No		City	Salary	No	No.
Georgia							
Athens	No	No		City		No	Yes.
Atlanta	Yes	Yes	None	Members	All by assoc.	Yes	Yes.
Brunswick				City		No	Yes.
Carrollton	Yes	No				Yes	Yes.
Moultrie	No	No				No	Yes.
Newnan				City pays salary			
Rome	Yes	No	Salary	City	City salary; assn. $10 wk.	Yes	Yes.
Valdosta	No	No					Yes.
Idaho							
Boise	Yes	City pays salary, though there is no law compelling it.					Yes.
Pocatello	No	No				No	Yes.
Illinois							
Aurora	Yes	Yes	2%	City	Assn. pays for sickness		
Belvidere	No	No	City pays sal'y			No	Yes.

TABLE NO. 3—PENSIONS AND BENEFITS. INSTRUCTION AND INSPECTION.—Continued.

City and State.	Have firemen benev. or similar organizations?	Is there a pension fund?	What proportion does city contribute?	Incase of accident, who pays the award?	What percent. is paid by city and what by association?	Is there a school or other organized instruction?	Do men inspect buildings to learn condition?
Illinois (Continued)							
Bloomington	Yes	Yes	1% ins. tax	City		No	Yes
Cairo	No	No		City		No	Yes
Champaign	No	Yes	State Indemnity Assn. and Ill. Firemen's Assn. pay $2 daily			Yes	Yes
Charleston	No	No	State Indemnity Assn. and Ill. Firemen's Assn. pay $2 daily			No	
Chester	No	No	State Indemnity Assn. and Ill. Firemen's Assn. pay $2 daily			No	Officers
Chicago	Yes	Yes	By taxation	City one year			Monthly.
Cicero Heights	No	No		City pays salary		No	Occasnly.
E. St. Louis		Yes	1% of licenses	City		No	Yes
Elgin	No	Yes	1% of licenses, 2% of foreign insurance and 1% of firemen's salaries			No	In bus. dist.
Evanston	No	Yes	3 10 mill	Pension fund	Half pay	No	Yes
Highlands	Yes	Yes	½	Ill. Firemen's Assn.		No	Yes
Joliet	Yes	Yes	1% licenses	Ill. Firemen's Assn.			Yes
Macomb	Yes	Yes		Ill. Firemen's Assn.	All by assn.		Yes
Murphysboro	No	No		City		No	Yes
Pana				City and Illinois Firemen's Assn.		No	Yes
Paris			1.50 assessmt.	City and Illinois Firemen's Assn.			Yes
Paxton	Yes	No		City and Illinois Firemen's Assn.		No	Yes
Pekin	No	No		City and Illinois Firemen's Assn.		Yes	Yes
Waukegan		Yes					Yes
Witt				Ill. Firemen's Assn.		Yes	Yes
Woodstock	No	No					
Indiana							
Anderson	Yes	Yes	1/10 mill	Insurance Co.		No	Yes
Decatur	No	No					Yes
Elkhart	No	No		City		No	Yes
Frankfort	No	No		City		No	Yes
Garrett	No	No				No	No
Gary	No	Yes	1 20 mill	Pension fund	Depends on rank	No	Yes
Jasper	No	No		City		Yes	Yes
Kokomo	No	No		City	City pays sal'y	Yes	Yes
Lafayette	No	Yes	1c. tax	City	City pays sal'y	No	Yes
La Porte	No	No				Yes	Yes
Lawrenceburg	No	No				No	Chief.
Plymouth	No	No					Yes
Portland	No	No		City		No	No
Richmond	No	No				No	Yes
Shelbyville	No	No					Yes
Sullivan	No	No				No	No
Terre Haute	No	Yes	1/10 mill	City		No	Yes
Vincennes	No	No				No	Yes
Wabash	No	No		City		Yes	Yes
Warsaw	Yes		$1 a day	City and company	66⅔	No	Yes
Washington	No	No		City		No	Yes
Whiting	No	No				No	Yes
Iowa							
Burlington		Yes	One-tenth	City	City pays sal'y	No	Yes
Cedar Rapids	No	Yes	¼ mill	City	All by city	Yes	Yes
Council Bluffs		Yes	½ mill plus 1% of salaries.				
Davenport	Yes	Yes	¼ mill	City pays salary 1 year		Yes	Yes
Denison	No	No					
Fairfield	No	No	Insurance Co.			No	No
Grinnell		No					Yes
Keokuk	No	Yes	1/10 mill	Fund pays ½ salary		No	No
Le Mars		Yes					Occasnly.
Marion		Yes	$600	Benefit fund			
Mason City		Yes	20%	City		Yes	Yes
Muscatine	No	No	City pays ½ salary 4 weeks in case of accident or sickness.				
New Hampton	No	No					Yes
Oelwein	No	No		City			Yes
Sioux City	No	Yes	All but 1% of salary, etc.	City			Yes
Washington	Yes	No					Yes
Waterloo		Yes	1/10 mill on taxes	City pays salary for 3 months			Yes
Kansas							
Cherryvale	No	No		Insurance Co.		Yes	Yes
Fredonia			All from State fund.				
Holton	Yes	Yes		Relief Assn.			Yes
Independence	No	No		Relief Assn.		Yes	Yes
Kansas City	Yes	Yes	All	Relief Assn.		Yes	Yes
Newton	Yes	No	Salary	Relief Assn.		No	Yes
Olathe	Yes	No		Relief Assn.		No	Yes
Parsons	Yes	No		Relief Assn.		No	Yes
Topeka	Yes	Yes		2% tax on foreign insurance companies		Yes	Yes
Kentucky							
Harrodsburg	No	No				No	Yes
Henderson	No	No	Salary	No pay		Yes	Yes
Hopkinsville	No	No					Yes
Lexington	No	No				Yes	
Russellville	Yes	No		All by city		Yes	Yes
Louisiana							
New Orleans	Yes	Yes	1%	Pension fund		Yes	Yes
Maine							
Augusta	Yes	No		Assn.		No	
Biddeford	Yes	No		Assn.		No	No
Dexter	No	No					Yes
Portland	Yes	Yes		Relief Assn.	All by Assn.	No	Yes
Rumford	Yes	Yes		Relief Assn.		No	Yes
Skowhegan	No	No				No	Yes
Maryland:							
Baltimore	Yes	Yes	All	The City	All by city	Yes	No

The WEEK'S NEWS

Road Material Embargo Hits California—Traffic Relief Viaduct in New York City—Milk Supply Control in New York Municipalities—The Passaic Valley Sewer Delays—Water Waste in Niagara Falls—Big Factory Fire in New York City—State Fire Prevention in Illinois—The California Red Light "Abatement" Law Held Constitutional —Election Results in Many Cities—Votes on City Manager and Commission Government—Baltimore to Draft New Charter—Developing the Waterfront of Philadelphia.

ROADS AND PAVEMENTS

Appropriations for Freeing Bridges Available.

Trenton, N. J.—Appropriations made by the last legislature for the fiscal year beginning November 1, 1917, have now become available and in these sums is included the $100,000 for freeing of bridges spanning the Delaware river between Trenton and Water Gap region. This sum, with $100,000 appropriated last year, makes $200,000 of New Jersey money available at this time for free bridges. A like amount is available from the Pennsylvania state treasury, making $400,000 in all with which the New Jersey and Pennsylvania Joint Free Bridge Commission has to start its work of freeing toll bridges. The Joint Commission, of which Governor Brumbaugh of Pennsylvania is chairman and John A. Campbell of this city is vice chairman, has about completed negotiations for the purchase of the Pennsylvania Railroad Company's bridge at Bridge street, Trenton. It is understood that $200,000 will be paid for this bridge and that it will be made free in the course of a month or two. Negotiations are also pending for purchase of the bridge between Point Pleasant, Pa., and Byram, N. J. These two bridges and possibly one or two more will be bought with the $400,000 in hand.

Protests Against Embargo on Road Materials.

Sacramento, Cal.—The state highway commission has protested against the federal embargo on the use of open cars for the transportation of building materials, particularly rock, gravel and cement, as a serious detriment to road construction. In support of this contention the commission has telegraphed to vice chairman A. F. Naftzger of the State Council of Defense, San Francisco, and Robert S. Lovett of the War Industries Board at Washington, requesting that the impediments be removed so far as the requirements of the state highway work are involved. This new element entering into the already serious situation as it relates to increased cost of materials, car shortage and scarcity of labor, has brought the highway commission face to face with a serious problem, which threatens to cause a suspension of some of the most important construction work now under way or about to be commenced. The letter to the State Council of Defense says: "The state highway work of California will be most seriously embarrassed and indeed brought almost to a termination. Not only will the contractors engaged upon contracts, aggregating about $4,000,000, be put to great pecuniary loss, but much of the great road program upon which the state is engaged will have to be postponed indefinitely. We feel that this work, which is manifestly of great importance to the nation as well as to the state, should not be impeded and request that as the head of the State Council of Defense you do all in your power to secure the removal of the embargo as far as the requirements of the state highway work are involved." The letter to the War Industries Board says: "If war necessity demands this embargo without exception we cheerfully acquiesce and the government can count on California in this as in all other crises. Before determining such a necessity please take into consideration the peculiar situation in California. This embargo will practically terminate our activity. Not only will the contractors engaged upon contracts aggregating about four million dollars be put to great pecuniary loss, but much of our great road program, vital not only to the state but to the nation, will be indefinitely postponed. Since January 1st we have examined and reported on twelve thousand miles of roads of possible military value. The roads we are now building and which are imperiled by this embargo are the backbone of the road system between the Sierras and the sea on a thousand miles of unprotected sea coast and connecting with the transcontinental road arteries. If these considerations are of weight we ask for an exception."

Convict Road Work in Missouri County.

Mineola, Mo.—The first state road camp in Missouri, using honor men from the state prison, has been established at Mineola, Montgomery county. Governor Frederick D. Gardner has continually urged the use of state prisoners in the construction of better roads throughout Missouri. Montgomery county was the first county to make formal application to the state highway department and the state prison board for the use of prison labor in road work. The Mineola special road district had voted bonds to pay one-half the cost of constructing the eight-mile link of the National Old Trails road within the district, and, finding it impossible to secure local labor, induced the county court to make formal application for thirty men from the state prison to assist in the work of construction. Twenty-five of these men are employed on the road, and five of them are detailed for cooking, laundry work, etc., about the camp. The road district pays the state prison board $1.25 per day for each man actually engaged in road work, and the state highway department will reimburse the district for one-half this amount as the work progresses. The money paid for the men actually employed on the roads covers the expense of housing, boarding and transporting the entire camp, and also includes the salary of a foreman supplied by the prison board, the services of the men required to maintain the camp, as cooks, etc. Warden Gilvin, of the state prison reports that 500 men now available for road work, and all counties desiring to obtain their services should make formal applications to the state highway department and state prison board through their county courts. The men will be furnished upon the same terms as those supplied to the Mineola road district. The honor system is used exclusively in working the men at Mineola. They work without guards and are not dressed in stripes. The camp is sanitary and attractive, and is lighted by electricity from a small plant. Bathing facilities are supplied. The food is plentiful and wholesome, much of it being obtained locally. Newspapers and magazines are provided, and the entire surroundings made as attractive and agreeable as possible. These honor men have been found honest and energetic; they perform a faithful day's work, and show a keen appreciation of the confidence manifested by the state department in them.

Big Street Viaduct to Relieve Traffic Congestion.

New York, N. Y.—Actual work has begun on the construction of a new viaduct, long desired, connecting 40th street and Park avenue with the roadway on the upper level of the Grand Central terminal. It will be two blocks in length, 36 feet wide, and will connect with the Grand Central roadway, which has a width of 40 feet. An appropriation of $587,000 was made by the Board of Estimate, partly under the last administration, on the initia-

tive of George McAneny. It is expected to relieve the congestion of traffic in Park avenue, Madison avenue and Fifth avenue. In the further development of Park avenue all conflicting interests have been satisfied and arrangements have been concluded to build a ramp on the easterly side of Park avenue from 32d to 34th street, which will about double the traffic facilities of that section. At 32d street and 4th avenue all the traffic is now congested into a single roadway and relief at this point is absolutely necessary. For years there has been contention, but finally a satisfactory plan has been approved at comparatively small expenditure on the part of the city and also at a very reasonable cost to private owners. The traffic increase in the neighborhood of 42d street has been most remarkable during the last eight years. On 5th avenue the increase from 1908 to 1917 is nearly 100 per cent. This is due largely to the more rapid movement of vehicles on account of general use of automobiles. In connection with the roadway on the upper level of the Grand Central Terminal, this viaduct will carry the public around the westerly side of the station between 40th and 45th streets. There has been considerable delay in beginning this work on account of the construction of a subway connection between Park avenue and Lexington avenue. The foundations of the viaduct are intimately related to the subway structure; in some cases, resting upon its roof. The viaduct will add materially to the architectural development around the Grand Central Terminal. It will give a much more finished appearance to the station when viewed from the south. It is to be hoped that the eastern driveway around the Grand Central Terminal will also be opened up so that all the traffic going north and south may not be congested in the one thoroughfare. When a few years ago the city made an agreement with the New York Central Railroad for the Grand Central Terminal improvements, it was probably not realized that this early need by the city for the use of Depew place as a traffic artery would develop. With the opening to traffic on the Park avenue viaduct, on the additional roadway at 34th street and Depew place, the congestion in the vicinity of 42d street, Grand Central Station and Fifth avenue will be materially relieved.

SEWERAGE AND SANITATION

Publication of Milk Score Reports.

Hartford, Conn.—The State department of health recently issued the following statement on the publication of ratings for milk supplies: "The publishing of the reports of laboratory analyses of milk in daily newspapers has been done by health officers with good intentions, but it is the opinion of this department that such reports are likely to do an injustice to milkmen, for the reason that accidental conditions may at times, make it appear that their product was generally bad. If health officers desire to publish ratings, we would suggest that nothing less than an average report of at least six samples be published. The best use the health officer can make of the reports on milk samples is to use them for correcting bad conditions. For instance, if a milkman has been running low in bacteria count and a sample or two shows a high count, it indicates that there are conditions needing correction and the health officer should assist the milkman in locating the trouble rather than publishing a poor record without action. Publicity has its place, but publicity should in milk inspection follow co-operation."

Control of Milk Supply in New York Cities.

Albany, N. Y.—A preliminary report on bacteriological work in cities of New York state, covering about half of them, has been sent out by W. P. Capes, director of the State Bureau of Information of the State Conference of Mayors. The data shows that out of twenty-six cities upon which a report is made, only five or six make no attempt to ascertain what kind of milk is sold within their limits. The places where milk is sold without any information available as to whether it is pure are Oswego, Hudson, Johnstown, Kingston and Plattsburgh. All of the larger and more progressive cities of the state either maintain separate departments or contribute to county laboratories where all bacteriological work is done. Still others get their examinations made at laboratories in their vicinity at so much per count. In the preliminary report, Mr. Capes names these cities as among those who have their milk tested: Albany, Amsterdam, Auburn, Batavia, Binghamton, Buffalo, Canandaigua, Cortland, Fulton, Lackawanna, Little Falls, Mount Vernon, Newburgh, New Rochelle, Niagara Falls, North Tonawanda, Olean, Oneida, Rochester, Rome, Saratoga, Schenectady, Sherrill, Syracuse, Troy and Utica. All of the larger cities of course have elaborate departments which examine for adulterants, cream, milk, coal, misbranded food, etc. Amsterdam pays a city bacteriologist $800 a year. Auburn pays one $1,750; $1,000 from the health department and $750 from the water department. Binghamton pays $700 a year. Canandaigua reports that there is a county bacteriologist who receives a salary of $1,500 a year and is allowed to do outside work. Cortland has its work done at the Cortland Normal, while Fulton sends its samples to the Syracuse municipal laboratory at a cost of seventy-five cents a count. Little Falls sends its milk to a Utica bacteriologist. Niagara Falls pays its officer $1,000 a year and the expenses of its laboratory are $1,200 a year—a total cost of only $2,200 for this highly important work. Syracuse pays its expert $2,000 a year and the total cost of the laboratory is $5,450. Utica pays $1,000 and the other expenses are about $1,000 exclusive of the salary of the helper, who is also an inspector in the health department.

Completion of Passaic Valley Sewer Postponed.

Newark, N. J.—Completion of the Passaic Valley sewer is not now expected before the spring of 1919 despite the plans and hope of the sewer commission to have it ready by December 31 of next year, the time set for finishing the work. Adrian Riker, counsel for the commission, made this statement in an official pronouncement covering the history of the construction made before representatives of all interested municipalities who were the guests of the sewer commission on an all day tour of inspection. The delays were explained, unexpected obstacles encountered in the work were enumerated and detailed data on the cost presented, showing why expenditures had climbed high above the original estimate of $11,500,000, and is now placed at $15,500,000. However, Mr. Riker explained, amounts to be paid by additional municipalities coming into the league will so reduce pro rata assessments on the fifteen original municipalities in the contract that the cost to these fifteen will not exceed $12,000,000, and may fall to the $11,250,000 originally fixed. "The date of completion and commencement of the operation of the works is dependent upon the construction of the tunnel section beneath New York Bay," said Mr. Riker. "Completion of all other work can be timed, so far as engineering considerations are concerned, to coincide with the completion of the tunnel work. It is reasonable to anticipate that the outfall tunnel and terminal chamber can be ready for operation as early as the spring of 1919, provided that the terminal chamber be placed under contract within the next four or five months. Fully a year will be consumed in arranging for the interception of the municipal sewers. These connections should be constructed during the coming season."

Referring to the estimated cost of $11,250,000, made by the members of the commission acting in 1908, Mr. Riker said: "In estimating the probable cost of the project they had the advice and relied upon the experience of Messrs. Hering and Fuller and of E. W. Harrison, all eminent specialists in the designing and constructing of large sewerage works. Upon the data available to the engineers and the commissioners I thi k I can state confidently that the estimate of the cost of the project was justified. When five of the municipalities in the district declined to join in the contract for the construction of the sewer the plans and specifications were modified, as required by law, and it was then estimated that the modifications made would reduce the cost of the enterprise to the sum of $11,250,000. Actual experience in the construction of the sewer has demonstrated that the reduction in the cost of the sewer by reason of the modifications in the plan

was in fact overestimated to a large extent; but in any case it has since been fully demonstrated that at no time after September, 1911, has it been possible to construct the works as specified in the contract for less than $13,500,000. Between June, 1916, and June 1, 1917, when the supplemental contract was executed by the fifteen municipalities, the world calamity of war involved the United States, with the result that the cost of labor and material and of construction work generally has advanced in many cases as much as 100 per cent. Assurances given in the summer of 1916 as to the maximum cost of the completion of Section 2 failed of realization. In the summer of 1917, the lowest actual bid was about $1,000,000 in excess of the maximum indicated in the summer of 1916. The rest of the work still uncontracted for was estimated in 1916 to cost approximately $1,000,000. At this time, because of the war conditions now existing, it is not safe to estimate the cost at less than $2,000 000. It has, therefore, become necessary for the commissioners to ask the municipalities to make a further appropriation of $2,000,000, or in all, $15,500,000. So far as the fifteen municipalities which executed the original contract are concerned, if the other municipalities within the district which have applied for admission to the sewer shall be admitted their contribution to the cost will be at least $2,500,000. There are also to be credited to the fifteen contracting municipalities interest on deposits received by the commissioners, and interest on installments delayed in payment, which will, together, amount to over $900,000; with the result that the total capital payments by the fifteen municipalities parties to the original contract will not greatly exceed $12,000,000. There still remains the Town of Montclair, which is located within the district, and which has not as yet signified any desire to join in the intercepting sewer project. If it should at any time hereafter conclude to do so and shall be admitted, its contribution to the cost of the sewer will be sufficient to reduce the payments by the fifteen municipalities to approximately $11,250,000, the amount of the original estimate. While the excess of the construction cost over the original estimates in this case is unfortunate and a matter of sincere disappointment to the commissioners and every one else concerned, it is in fact not a bad showing when consideration is given to the changed conditions since 1910."

In their tour the mayors and commission took in the pumping station and sedimentation basins on the meadows and the immense tunnel to the point of discharge in New York Bay. The party included sewerage commissioners Bernard W. Terlinde, James P. Logan, Dr. Frank J. Van Noort, James G. Blauvelt and Robert E. Torrance, chief engineer William M. Brown, assistant engineers William G. Taylor and J. Ralph Van Duyne and secretary-treasurer Joseph H. Quigg, mayors Amos H. Radcliffe of Paterson, George N. Seger of Passaic, John H. Waters of Belleville, William Black of Rutherford, John C. Weaver of East Rutherford, Cornelius A. McGlennon of East Newark, Emil Diebitsch of Nutley, Charles A. Garland of Union, James J. Ryan of Wallington, William J. Brandenburg, Jr., of North Arlington, Ernest B. Dahnert of Garfield, Clarence W. Finkle of Clifton, Worrall F. Mountain of East Orange, Daniel F. Minahan of Orange, William Brueckman of Haledon and Henry S. Babbage of Glen Ridge. Harrison was represented by Alderman Frederick Clifton and Prospect Park by Peter Pousman.

The South Bend Controversy.

South Bend, Ind.—Dr. J. N. Hurty of the state board of health in a new statement says: "I deny absolutely that I ever said: 'South Bend is the dirtiest city in the state.' Instead of being the dirtiest city in the state, South Bend is one of the cleanest, and to me one of the most attractive cities, in the state. Of course, South Bend has some areas as dirty as any city in the state, but I believe them proportionately fewer than in Indianapolis. Here and now I wish most emphatically to state over my signature—'There is no cleaner or fairer city than South Bend in the state of Indiana. And I will further state that no city in Indiana is as clean as it should be. Noisome privies, f which South Bend has very many, are a constant threat against public health. They are a storehouse of poisons of various kinds. They may and frequently do contain the poisons of typhoid fever, dysentery and other diarrheal diseases. Any city, with privies which pollute the ground and air and which are accessible to flies, invites disease and death. To do this is bad business. In Washington I talked with Dr. Carrol Fox about typhoid in South Bend. He said—"I am not surprised—the expected has happened, and it will happen again and again until the city abolishes its insanitary privies." Your water supply is not a menace to the health of South Bend. It is not perfect, but may be classed as very good. However, this does not mean it should not be further guarded. I advise the guard be doubled and that every drop be chlorinated, for it may become polluted at any time. All public water supplies, no matter how pure, may become polluted at any time and the practical, businesslike way is to chemically purify them every time and all the time. If, after this experience, open privies are not abolished and the public water supply of South Bend is not chemically purified, then surely stupidity will rule.'" A letter from Dr. Will Shimer, who was sent to the investigation of the epidemic by the state health board, describes this version of what happened at a meeting of the St. Joseph County Medical Society. He says:

"At this meeting I discussed the typhoid cases and deaths as reported in the previous 15 months. This seemed to indicate to me that a typhoid epidemic had been prevalent in South Bend for more than a year. A careful study of the information which I had obtained about many persons then sick with typhoid in South Bend convinced me that not one thing alone, but several, were the cause of the epidemic. The spot map which I had made and showed to the society indicated that there was a very close relationship between the cases which had occurred in the previous months and those that were existing at that time. At the close of my explanation I advocated vaccination of all of the school children and all other adults that cared to avail themselves of this protection.

"Some of the members of the society immediately brought up the question of the price to be charged for vaccination, making the statement that in a previous smallpox epidemic the prices had gone to the ridiculous sum of 25 cents. It seemed to be generally agreed that no charge should be above $5, but was to be left to the discretion of the individual doctor in each case as to whether the fee was to be any less than that. I told them that if they followed my advice and instituted compulsory vaccination there would be many persons who would not be able to pay this reasonable fee and that some provision must be made by the medical society for doing charity work.

"There was not a single man who volunteered to assist the health officer in this work. It was then that I told the medical society that they as citizens of South Bend and as physicians were to some degree at least responsible for the present epidemic. My personal investigation of many cases revealed the fact that none of the people taking care of the sick had been instructed how to take efficiently of the body's discharges so as to prevent other cases and in only one instance had the doctor suggested typhoid vaccination for the well members of the family.

"The health officer then got up and excused the physicians by saying: 'Perhaps the members of the medical society had not kept up on the prevention of typhoid because they had felt so sure that typhoid could not become epidemic in South Bend.' Yet at the same time the health officer was speaking typhoid had been epidemic in South Bend for more than a year.

"I have talked this matter over with Mr. Diggs, who was present at the meeting, and he agrees with me that this is what was said and done at this time. I do not doubt but that the members of the society will disagree with me in detail, but in a general way this is substantially what was said and done. An unbiased account of the meeting might have been obtained if a reporter present to report the meeting had not ben forced to leave by the unanimous vote of the society just before my report was made."

WATER SUPPLY

Free Water for Institutions.

Columbus, O.—The city council has passed an ordinance to relieve certain institutions from the payment of bills for water service. The ordinance says: "Hospitals, asylums and other institutions devoted to the relief of the poor, the aged, the infirm or destitute persons or orphan children, situated within the corporate limits of the city and not maintained by general taxation, desiring to be relieved from the payment of bills for water service, shall make application for such relief, at the office of the division of water, upon prepared forms, detailing information. The division of water shall investigate each application, and, together with application, within ten days after its

receipt, shall file with the clerk of the city council a report showing number of rooms, conditions of plumbing, arrangement of meter and service supply water for power, elevator, domestic and other charitable, partly charitable and non-charitable purposes. Council reserves the right to reject any application for water free of charge, and may require at any time the payment of any bill or part of any bill, for water supplied such hospital or institution, which, in its judgment, is deemed just and reasonable. The clerk of the city council, upon recommendation of the committee on water of council, may demand of any hospital or institution applying for or receiving water free of charge or at a special rate, a detailed statement for any certain period, of its revenues and expenditures and specific information regarding the work it has done; such report to be filed with the city clerk within ten days after demand is made. Hospitals or institutions granted water free of charge shall notify the division of water of any changes or alterations in plumbing or buildings as soon as completed; and the division of water shall make periodical inspections of such hospitals and institutions, and, if changes or alterations conflict with original report of service supplied, the city clerk shall be promptly notified. Wastage of water by reason of defective plumbing or otherwise shall be avoided by such hospitals and institutions, and the privileges granted by this ordinance revoked if such wastage is not stopped within five days after notifications by the division of water that such wastage exists. The division of water of the department of public service, at its regular semi-annual collection periods, shall, at the then current rate per one thousand cubic feet charged general consumers for water, render to the council bills for the amount of water used by the hospitals and institutions granted the use of water free of charge under conditions and terms named herein, which bills shall be promptly paid to the said division of water out of the general revenue fund of the city upon provision being made therefor by the council. If such bills are not so authorized by council to be paid to the division of water within the time limit allowed for the payment of regulat semi-annual water bills, the division of water is hereby authorized and directed to notify such hospitals and institutions that all bills for water supplied from the date for which said bills are rendered will be required to be paid by such hospitals and institutions; and all such hospitals and institutions, in such case, shall be required to pay for all water supplied them by the division of water, unless and until provision is made for its payment by said council."

City Refuses to Sell Plant.

Windsor, Ont.—Windsor water works will not be sold nor leased to the Essex border utilities commission, which is planning to supply water to Ojibway and other municipalities west of Windsor, according to a statement by a member of the border city water commission. Negotiations were recently made by the utilities commission to secure a supply of water, lease of the plant, or at so much per 1,000 gallons. The Windsor board is ready to sell water, but not its plant, the commissioner said. Now that Windsor has refused to sell or lease, steps may be taken by the utilities commission to take over the Walkerville plant.

Pitometer Survey Finds Waste.

Niagara Falls, N. Y.—City manager Carr has reported to city council as follows: "Some time ago the city council authorized the employment of the Pitometer Company of New York to make a survey for leaks in our water distribution system. This survey has been completed. Apparently very few leaks were found. Two leaks in service connections were located and a considerable leakage through defective plumbing is reported, together with two large meters which are reported as running, one 13 per cent slow, the other 20 per cent slow. The operator claims that 80,000 gallons of water are wasted on Kosciusko street between East Falls street and the Erie railroad and 200,000 gallons per day are wasted on Eleventh street between Buffalo avenue and East Falls street, this wastage being due to defective plumbing and hopper closets. The error in the two large meters delivered to two of our local plants amounts to about $176 per quarter. All these defects will be corrected, after which time a check will be made on the claims of this company to determine as to whether they have fulfilled their contract in calling our attention to a wastage amounting to 3 1-3 million gallons per year.

FIRE AND POLICE

Thorough Inspection by State Fire Marshal.

Champaign, Ill.—Four members of the state fire marshal's department in Springfield, assisted by deputy fire marshal Charles J. Roberts, have given Champaign and Urbana the most thorough fire inspection the Twin Cities have ever had. Every school, church and business house in the two cities were visited within a period of ten days and a searching examination of conditions relating to fire prevention made. A total of 612 inspections was made and 348 defects were found. These defects consisted mostly of poor electric wiring, badly constructed or dangerous fire escapes, large piles of rubbish or old buildings in a bad state of repair. In certain few cases the property owner or tenant objected to the inspection and also to the order to make changes in the premises to conform with the law where such change seemed necessary to the inspectors. The men who visited the school-houses commented on the excellent condition in which they found the buildings and premises, and the best premises were declared to be as well prepared against fire as any in the state. Each place visited was given a card, and where there was a fire law violation the inspections will be rechecked at an early date to see that the orders have been complied with.

$1,500,000 Fire in Munitions Plant.

New York, N. Y.—The plant of the Washburn Wire Company, located on the East river, was destroyed by fire, said to be of incendiary origin. The factory was working on contracts for government war needs, turning out springs used in the manufacturing of rifles and ammunition. A large addition to the plant had just been completed. The big blaze imperiled a large section of nearby tenement houses, so that thousands of persons were ordered out of their homes. At least 100,000 persons watched the plant burn. Old and experienced firemen said it was one of the most spectacular fires they ever saw. The damage was estimated at $2,000,000. The destruction of the plant brought out the fact that enemy aliens were working in territory expressly forbidden to them by the President's proclamation of April 6. In the force of 1,000 men there were at least twenty Germans, not naturalized, a number of German-Americans, and more than 200 Austrians, many of whom were not naturalized. A number of the enemy aliens were examined by fire marshal Brophy. Brophy said he had received information that the fire started in four places at once. The blaze first seen by most of the witnesses was in the basement on the 118th street side. Others said they saw fire on the second floor and on the first floor, in two places. The new section of the plant, a five-story brick structure, which had been equipped with new machinery and would have been put in operation within the week, was of fireproof construction and undoubtedly saved the rest of the block, made up of crowded tenements. A second alarm brought fire chief "Smoky Joe" Martin, acting chief in the absence of chief Kenlon, to the plant. He at once turned in three more alarms, bringing most of the apparatus in Manhattan. As soon as water tower 3 reached the scene it was shot up on the 118th street side, and a big stream of water poured on to the roof. It had not been in operation more than three minutes when there was a muffled explosion, and a wall toppled outward and on to the tower, demolishing it beneath a shower of bricks and injuring two firemen. A score of firefighters had almost miraculous escapes from the tons of falling brick in the narrow and crowded street. The floors of the building

were soaked with oil. There was much oil in the building, used in the manufacture of springs, and it lent fury to the flames. Several explosions due to oil occurred soon after the fire started. As the fire progressed, the crash of heavy machinery falling from the top floors could be heard for blocks. A big flywheel from the fifth floor fell in the midst of a group of firemen, injuring one of them. A brisk, shifting wind fanned the flames in every direction, and deputy chief Martin gave orders that the tenants in the apartment houses near by be warned. The firemen experienced difficulty because there was no high pressure available. The water was taken from old six-inch mains. The firemen were assisted by the three fireboats, the McClellan, Lawrence and Hewitt, which stuck their noses as close as possible to the blaze, and by three fire barges, which were a new equipment of the New York, New Haven & Hartford Railway yards, a half mile away. As the falling walls made the danger more acute, the police of the precinct, aided by reserves from half a dozen stations, pushed the crowds back. A falling wall seriously injured John Harvery of the fireboat McClellan. Michael Lynch of Truck 29 was at work on the East River side of the plant when he was caught in a shower of glass and suffered severe lacerations of the face and hands. Other firemen were injured.

After a four-hour fight chief Martin announced that the fire was under control. At that time it had destroyed the main section of the plant, gutted the new section, but leaving the walls standing, and had damaged nearby buildings slightly. Before that time Marshal Brophy with a corps of assistants summoned every one who knew anything about the fire to an office of the company in the machine shop. At the start he found a difference of opinion as to how many men were in the building when the fire started. Manager Turner said there should have been six or seven; patrolman Cowhen said that, judging from those he saw getting out of the plant, there must have been twenty-five; others put the number at thirty-five. The men at work were making repairs and getting the plant in shape for the night shift, scheduled to go to work at 7 o'clock, because of the urgency of orders. "It was the worst fire that the department has had to fight in years," said chief Martin. "I am sure that from the rapid spread of the flames large quantities of oil must have been stored in the building. I saw flames break out at different points, and a fire usually starts at one point. I cannot account for this fire having made such great headway in such a short time. The rapid spread of the flames was remarkable in view of the sprinkling system installed in the factory."

Most of Department at Fatal Tenement Fire.

Lowell, Mass.—Trapped by smoke and flames on the top floor of a three-story wooden structure, containing twelve tenements, four persons, a man and three children, were suffocated and burned to death in a fire which swept through the building shortly after 11 o'clock at night. When found, the bodies were burned to a crisp. So far as fatalities are concerned it was one of the worst fires in the history of the city. People living on the second and third stories of the building, unable to make their escape by either the front or rear stairway, owing to the smoke and flames, jumped to the ground and about a dozen suffered from burns and injuries. Five people were removed to hospitals while others were attended by doctors who arrived on the scene shortly after the sounding of a second alarm of fire. But for the prompt and efficient work of the members of the fire department, the loss of lives and damage to property would have been very large. Although seriously handicapped by the congestion of buildings and narrow passageways in which they had to work, also by the smoke and flames, the firemen did excellent work. The sounding of a second alarm twelve minutes after the first alarm was sent in brought the major portion of the fire apparatus to the scene, as well as a score of police officers, doctors and the ambulance.

There were about sixty people housed in the tenements in the building and owing to the lateness of the hour every one was in bed. The flames made such rapid headway after being discovered that those on the second and third floors found it impossible to escape without jumping through windows or lowering themselves by means of clothes lines, to the ground. The fire, the cause of which is unknown, had its inception in a closet in a hallway on the first floor, midway between the front and rear stairways. Chief Edward F. Saunders of the fire department and members of the district police investigated conditions. Eight lines of hose were used and several chemical lines were played on the flames. The work of the firemen was greatly retarded by the dense volumes of smoke, but a couple of the firemen, equipped with smoke masks, made their way into the burning building and carried people to windows, who were taken down the ladders to the ground. It was about midnight, after the fire was pretty well under control, that firemen discovered the bodies of the four victims on the top floor.

Fire Commissioner Closes Business on Residence Street.

New York, N. Y.—Following the receipt of many protests from residents living in the vicinity, fire commissioner Adamson issued an order directing the discontinuance of a ladies' tailoring shop, recently opened for business in a high-class residence section of the city. Under the procedure laid down by the corporation counsel a notice was served on the proprietor of the tailoring establishment, directing him to cease using the premises for business purposes within ten days. The tailoring shop is cited by the commissioner as furnishing an excellent example of the protection the new zoning law affords to property owners from the intrusion of a business occupancy in a community of private residences. Before the act took effect, in July, 1916, there was no legal barrier to prevent a tailor or a butcher or a grocer or a business occupancy of any kind from going into a neighborhood exclusively of private homes, with the resulting injury to private residence values. The enforcement of this law is given to the fire commissioner.

"Abatement Law" Declared Constitutional.

San Francisco, Cal.—The red light abatement law has been declared constitutional by the District Court of Appeals in two decisions by Judge Thomas J. Lennon. The decisions followed appeals from the Superior Courts in the cases of the State against the Casa Company and James C. Hown against Joseph Alexander of the North End Realty Company and others. As a result of the Casa decision several pieces of local property will have to remain closed for one year. Appeal was made on the ground that the law was class legislation, but judge Lennon ruled that the state's right of police power was sufficiently broad to cover the legality of the act. Judge Lennon also held that owners of property were to be held responsible for the character of the occupants. "Every owner of property who leases it to another," he said, "owes the public a certain degree of diligence and proof of the general reputation of the place."

Fire Inspection of Food Storage.

Springfield, Ill.—The division of fire prevention has issued credentials to one hundred special inspectors, who have been recommended by the conservation committee in Illinois to cover the entire state outside of Chicago, which has already received attention. These special men are to make a survey of fire-hazard conditions as to elevators, flour mills, grain and hay warehouses, warehouses, wholesale groceries, cold storage warehouses, packing and slaughter houses, stock-yards, breweries, malt houses, distilleries, bakeries and coal mines. A special book of instructions has been gotten out under the direction of state fire marshal Gambler, and each inspector is to make his report in accordance with the adopted rules. All reports are sent direct to the fire marshal. Upon completion of this work by the special inspectors the regular deputy fire marshals will be assigned to check up inspections and see that recommendations for safeguarding such property are carried out. It is expected that owners and proprietors of such establishments will in the meantime give proper attention to the correction of defects found to exist upon their premises.

GOVERNMENT AND FINANCE

Court Validates Bonds for Improvements.

St. Petersburg, Fla.—The supreme court of the state has declared valid a $180,000 bond issue which is to be sold in a few weeks. The money is to be used for the following purposes: Water front improvement, $133,000; improvement of city buildings, $5,000; sewer extensions, $30,000; purchase of railroad lots, $12,000. The development of the waterfront will include dredging estimated to amount to 275,000 cubic yards, a mile of slab sea wall and a municipal pier. Bids will be called for the work about a week after the bonds are sold. W. J. Overmen is director of public works and will have charge of the improvements.

City Gives Up Commission Form.

Lynn, Mass.—Lynn decided to overthrow the commission form of government after seven years' experience with it at the recent general election. Lynn's vote was almost two to one, 6,013 for the charter revision to 3,731 for retaining the commission. The new charter will go into effect in January and provides for a mayor and eleven aldermen, four at large and seven by wards. The charter change won in every one of the twenty-five precincts.

Referendum Elections in Massachusetts Cities.

Gloucester, Mass.—The preferential system of voting was adopted by Gloucester, 1,304 to 528. Under the plan voters may register first, second and third choices for all candidates.

Methuen, Mass.—Methuen decided ' favor of becoming a city by 912 to 450, thus giving Massachusetts its 38th city. Revere, Peabody, Leominster and Attleboro entered the ranks last year. There now remain sixteen towns with sufficient population under the state law—12,000—to become cities, but they feel that advantages of the town form of government make it not worth while for them to change. Methuen has 14,007.

Vote in Favor of Increased Salaries.

Trenton, N. J.—All four referenda were carried by substantial majorities and the salaries for almost all city employes will now be raised. School teachers of the city won their referendum by a majority of 4,899, the opposition to this being slight. The total vote was 7,829 for and 2,930 against. The firemen finished second in the referendum balloting, winning their increase by 3,394. The total vote on this question was 6,917 for and 3,523 against. The policemen trailed third, winning their increase by 2,169. The vote was 5,815 for and 3,646 against. The increase for city employes was not so popular. The total vote on this question was 5,399 for and 4,611 against, a majority of 788. The latter provision applies only to employes earning up to $1,950 a year.

Baltimore Favors New Charter.

Baltimore, Md.—By a heavy vote of 28,679 to 16,822, a majority of 11,857, the voters have approved the proposition to create a charter board to draft a new government instrument. The vote was a source of much gratification to the City-wide Congress which campaigned for the movement to submit to the people of Baltimore the question as to whether a new charter should be prepared under the terms of the home rule amendment to the state constution. William H. Maltbie, Dr. A. R. L. Dohme and DeCourcey W. Thom, three of the most active workers for the project, were particularly gratified. There will be no delay in getting down to the business of completing the big task within the prescribed limit of six months. At the end of that time a draft will be printed for public distribution and will be placed on the ballot at the next election, which occurs in November, 1918. It will then be up to the people to adopt the measure or to reject it. If adopted, it will then stand ratified and under the law the new form of government could be created and put in working operation before it became necessary to legislate any elective officers out of office, thus averting any personal hardships. Because of this favorable condition, the City-wide Congress deemed the recent election a most timely occasion for the introduction of the move for the amendment. The commission which automatically becomes an official body will be limited, in preparing a new charter, to the present powers granted the city by the legislature, or in other words, it cannot increase the authority granted the city by the legislature for its own government. Its powers consist entirely of rearranging the present powers of Baltimore in such a way as to elicit more benefits. In further explaining the proposition, Mr. Maltbie said: "The amendment gives to any county of the state or to Baltimore the right to adopt a new charter and provides that after the new charter is adopted, but not before, the community shall have the right to enact its own legislation without an appeal to the state legislature on all subjects which are covered by the grant of powers which the state has made to the counties or to Baltimore city, and it further provides that within that range the state legislature shall not legislate." The selection of the commission is made by the power granted any 2,000 citizens to unite in making nominations. Such a commission as provided for on the ballot has been nominated. The following men have agreed to serve on the body. J. Kemp Bartlett, Dr. John H. Latane, Alfred S. Niles, Charles E. Falconer, William J. Ogden, Edgar Allan Poe, David Bachrach, Henry D. Harlan, Dr. Charles O'Donovan, Adolph H. Hecht and William H. Maltbie.

Commission Government Approved.

Collingswood, N. J.—Commission government won by 48 majority at the recent election.

East St. Louis, Ill.—East St. Louis, by a vote of two to one, has adopted the commission form of government. Only about one-third of the voters cast their ballots at the polls. Out of a total of 7,238 votes cast there were 4,784 votes for the commission form of municipal control and 2,454 votes against it. The movement for the new form began after the recent race riots, and was backed by influential citizens and opposed by the city officials.

Clarksburg, W. Va.—The commission form of municipal government was adopted by the city of Clarksburg by a vote of 2,852 for and 760 against. The new charter will bring four suburban towns into the city, making Clarksburg the third largest city in West Virginia.

Favors Commission Government.

South Charleston, O.—With a majority of 114, South Charleston voted in favor of a commission form of government, at the recent special election. The votes in favor of the new charter were 180 for and 66 against it. South Charleston is the first village in the state to frame and adopt a charter, although many cities have done so. The charter calls for the election of three commissioners, elected on the non-partisan independent ballot. The commissioners will take the place of the nine men composing the present council and the board of public affairs. They are subject to recall by the voters at any time after their election if they prove unsatisfactory. According to the charter the commissioners will hold office for four years, commencing January 1, after their election, except for the one securing the lowest number of votes. He will serve for two years. Stewart L. Tatum was the attorney to the charter commission.

City Manager Plan Wins and Loses.

Waltham, Mass.—This city at the recent election declared itself dissatisfied with the present mayor and aldermen form of government, and voted in favor of the city manager plan. The vote on adoption of plan D, for a council of five and a manager, was carried by a fairly close majority. For it, 1,882; against it, 1,503. Under this plan there are to be no primaries and the five men receiving the highest votes will become members of the council. The leader among these will be mayor, and

will be paid $2,000 a year. The others have the right to vote themselves $500 a year if they so elect. The managers will be selected by the council. The first election under this plan will be held on December 4.

Haverhill, Mass.—Haverhill voters went against a change to plan D, for a mayor, council and city manager, and stuck to its present form with a mayor, four aldermen and four school committeemen, all holding office for two years. The vote stood: "No," 3,170; "yes," 1,775.

Winchester, Mass.—Winchester, the home of governor McCall, turned down the change to a town manager, 959 to 497. Selectman J. A. Laraway led the opposition.

Altoona, Pa.—Stevens, Cassidy, Westfall and Lafferty were elected city councilmen of Altoona by double the vote cast for the present board of councilmen. They are pledged to employ a city manager.

MISCELLANEOUS

Baltimore Does Not Want Civic Center.

Baltimore, Md.—By a vote of 22,500 against 25,274 the voters have disapproved the proposed loans which would have provided for a civic center at a cost of $3,000,000. Mayor Preston, who urged the loans, declared that the defeat of the $3,000,000 park loan would not stop the contemplated improvements at the civic center, St. Paul street and Mount Vernon square. He explained that the administration would go on with these improvements, although at a slower pace. Among the municipal administration leaders there was great regret over the failure of the voters to ratify the park loan, as it had been planned to not only complete the civic center and other downtown improvements, but to establish a number of "breathing spots" in the form of parked areas in the most congested sections of the city. Had the loan been ratified it is improbable that any of the stock would have been sold, as the sinking fund was sufficient to absorb the stock as the money was needed.

Waterfront Improvement in Philadelphia.

Philadelphia, Pa.—Work on the construction of the new city pier, at the foot of McKean street, Delaware River, is progressing so rapidly that it will be ready for use by June 1, 1918, according to the announcement made by director Webster, of the Department of Wharves, Docks and Ferries. This pier is the first of a group of ten to be built in the southern part of the city, to be known as the Moyomensing group. This is following out the plan of the dock department of building the piers in groups. Final bids, which will amount to about $300,000, are to be let soon. These will be for the laying of a concrete slab floor on the second deck, a Belgian block floor on the main deck, elevators, winches, electrical appliances, movable doors and other necessary equipment. This structure is to cost about $1,719,000. The dredging has been completed, the fill is 60 per cent done, the substructure 95 per cent complete and the superstructure about 50 per cent. To the Department of Wharves, Docks and Ferries has been assigned the work of developing the port. A broad policy of extension has been formulated to meet present demands as well as the era of industrial activity that is anticipated. Engineers, expert in city planning, particularly as it is applicable to future Philadelphia, are charged with the responsibility of carrying out the plan of improving and enlarging the harbor facilities. One item of the general loan included $3,300,000 for the acquisition of real estate, piers and terminal facilities in South Philadelpha from several railroad corporations, the whole to be used in the development of a large terminal available for shipping upon the waterside and countryside transportation upon the land side. Another loan item of $10,000,000 provides for the construction and improvement of wharves and docks, including the acquisition of land upon which to erect them; for the construction of bulkheads, and for the reclamation of land to be used for the construction of wharves and docks. The city's plans call for and the loan money provides for: The building of a great shipping terminal in South Philadelphia; the construction of ten new piers; the improvement and enlargement of a number of existing piers; the abolition of grade railroad crossings, which heretofore have acted as a deterrent to the development of South Philadelphia; the establishment of a joint or belt line railroad around the southern section of the city; the acquisition and reclamation of land; the construction of bulkheads; land being acquired by the city from public corporations and from private interests. One property, with a frontage of 284 feet upon the Delaware River, was acquired from the Lehigh Valley Railroad Company, and a modern pier, 100 feet wide and 535 feet long, with a one-story steel and concrete superstructure, intended for river steamer use, will be erected thereon. The recently enacted rivers and harbors bill passed by Congress carries $1,800,000 for the improvement of the Delaware River channel, $40,000 for the improvement of the upper Delaware, $300,000 for the Schuylkill River, a new project, and about $200,000 for streams tributary to the Delaware.

LEGAL NOTES

A Summary and Notes of Recent Decisions—Rulings of Interest to Municipalities

Extending Streets—Necessity.

(N. D.) The question of the necessity for the extension of a streer is legislative rather than judicial, and its determination is vested with local municipal legislative bodies, and a village ordinance is competent proof of such necessity.—Village of Ashley v. Minneapolis, St. P. & S. S. M. Ry. Co., 163 N. W. 727.

Gas and Electric Rate by Contract—Power to Change.

(N. Y. Sup.) A gas and electric company, which contracted with the mayor to furnish service at certain rates in consideration of his dismissing a suit against the company, and which furnished servce at those rates for a number of years, was thereafter estopped to deny the valdity of the contract on the ground that it was ultra vires as to the city.—Wackenhut v. Empire Gas & Electric Co., 166 N. Y. S. 29.

Revising City Ordinances—Extra Pay for City Attorney.

(S. D.) Where a city attorney revises the city ordinances without contract for extra pay he is not entitled to extra compensation therefor, since such services are incident to his office within Pol. Code, §1247, providing that he shall perform all services incident to his office.—Hosford v. City of Platte, 163 N. W. 714..

Statements by City Officials—Building City.

(Wash.) No statement by a councilman and city treasurer to one buying local improvement bonds from the contractor that under an ordinance the city would take them over and enforce the assessments, if they were not paid from the local improvement fund, could bind the city.—State v. City of Tacoma, 166 P. 66.

Valid and Invalid Parts of Ordinance.

(N. J.) The whole of a city ordinance will not be set aside because part of it is invalid, where the valid and invalid provisions are separable.—Koettegen v. City of Paterson, 101 A. 253.

Formality in Passing Ordinance.

(N. D.) Where the Legislature has not required the observance of any formality in the passage of village ordinances it is sufficient that an ordinance shall be proved to be the will of the governing body.—Village of Ashley v. Minneapolis, St. P. & S. S. M. Ry. Co., 163 N. W. 727.

Money Improperly Paid—Counter Claim for Salary Recovery.

(S. D.) A claim for money improperly paid by a city to a city officer can be pleaded as a counter claim in an action by such officer to recover his salary.—Hosford v. City of Platte, 163 N. W. 714.

THE MUNICIPAL INDEX

In Which Are Listed and Classified by Subjects All Articles Treating of Municipal Topics Which Have Appeared During the Past Month in the Leading Periodicals.

It is our purpose to give in the second issue of each month a list of all articles of any length or importance which have appeared in all the American periodicals and the leading English, French and German ones dealing more or less directly with municipal matters. The Index is kept up to date and the month of literature covered each time will be brought up to within two or three days of publication. Our chief object in this is to keep our readers in touch with all the current literature on municipal matters. In furtherance of this we will furnish any of the articles listed in the Index for the price named after each article, except that where an article is continued in two or three issues of the paper the price given is for each of said issues. In addition to the titles where these are not sufficiently descriptive or where the article is of sufficient importance, a brief statement of its contents is added. The length also is given, and the name of the author when it is a contributed article.

ROADS AND PAVEMENTS.

Asphalt:

Sheet Asphalt for Country Roads. Use of sheet asphalt by state and county highway authorities on heavy traffic road. By E. A. Trego. 2 ills. 1,100 words. Engineering and Contracting. Oct. 3. 10 cts.

Sheet Asphalt on Country Road. The first sheet asphalt road constructed by a county in New Jersey. Removing telford base and laying concrete base. 2 ills. 1,500 words. Municipal Journal. Oct. 11. 10 cts.

Resurface Old Macadam Roads with Rock Asphalt. Method employed in Kentucky costs from $6,000 to $7,000 per mile for a roadbed 14 ft. wide. 3 ills. 800 words. Engineering News-Record. Oct. 11. 15 cts.

Asphalt Plant:

Remodeling of Civic Asphalt Plant, Ottawa. Economy of operation of oil-burning mixer compared with use of coal. By the use of manganese steel shanks capacity of mixer was greatly increased. By L. McLaren Hunter. 8 ills. 1,500 words. Canadian Engineer. Oct. 25. 15 cts.

Bituminous:

Methods of Applying Bituminous Materials. Cold surface treatment; hot surface treatment; surface binders, penetration method. By G. Cameron Parker, Engineer of Highways, Ontario, Can. 2,500 words. The Surveyor. Aug. 31. 40 cts.

Clinker Asphaltic Macadam, Hounslow. Description of five sections constructed under different methods. Bitumen percentage and mesh composition for each case. By J. G. Carey. 4,000 words. The Surveyor. Oct. 5. 40 cts.

Brick:

The Recent Revision of Ideas About Brick Pavement Construction. Advantages and method of construction of the monolithic type. 3 ills. 3,000 words. Municipal Engineering. Oct. 25 cts.

Present Practice in the Construction of Brick Pavements in Chicago. By H. J. Fixmer. 2,000 words. Municipal Engineering. Oct. 25 cts.

Shale Cube Pavement on Stutson Street, Rochester, N. Y. By Geo. C. Wright. 1 ill. 600 words. Good Roads. Oct. 20. 10 cts.

Concrete:

The Four-Inch Concrete Roads of California. Type of road laid by state. Principal causes of the few actual failures with this type. 7 ills. 600 words. Engineering and Contracting. Oct. 3. 10 cts.

Speeding Up a Concrete Road Job by the Bonus System. Contractor on concrete road job increases by fifty per cent. the amount of work done by his equipment without enlarging the gang. A bonus is paid to every man on the mixer gang for each section of work in excess of the daily minimum. 5 ills. 2,200 words. Municipal Journal. Oct. 18. 10 cts.

Handling Aggregates for Concrete Roads. Dumping already proportioned batches direct from Koppel cars into mixer scoop. 700 words. Municipal Journal. Oct. 11. 10 cts.

La Salle's Concrete Causeway Has Become Popular. Difficulty of foreseeing traffic development is emphasized. Experience with reinforced concrete railing. By H. K. Higgins. 2 ills. 800 words. Engineering News-Record. Oct. 4. 15 cts.

Wet Road Concrete is Compacted by Transverse Rolling. Experiments for removing excess water from concrete. Rolling solved difficulty and improves concrete. By P. C. McArdle. 1 ill. 1,000 words. Engineering News-Record. Oct. 4. 15 cts.

Roller Method of Finishing Concrete Roads as Used by Vermilion County, Illinois. By P. C. McArdle. 1 ill. 1,000 words. Engineering and Contracting Co. Oct. 3. 10 cts.

Causes of Cracks in Concrete Pavements. From a paper by T. A. Goldbeck. 3,000 words. Concrete. Oct. 20 cts.

Use of Light Canvas Strip for Floating Concrete Pavement. Method of finishing concrete on state highway construction near Jamestown, N. Y. By Chas. T. Fisher. 2 ills. 700 words. Good Roads. Oct. 20. 10 cts.

New Jersey Concrete Road Construction. Reinforcing, curb protection bars, and one-two-three mix on road being built to carry part of the Camp Dix traffic. Surface-finishing concrete. Hauling construction materials. 4 ills. 1,000 words. Municipal Journal. Oct. 25. 10 cts.

Ohio State Concrete Roads Have New Specifications. Mix must be at least one minute. Variable proportion of cement may be used. 800 words. Cement and Engineering News. Oct. 20 cts.

Construction:

Dangerous Underpass Abolished. Replacing narrow and crooked underpass and straightening road. Excavating under railroad track and laying pavement. 4 ills. 1,000 words. Municipal Journal. Oct. 4. 10 cts.

Lengthening Radius of Curb Corners. 1 ill. 150 words. Municipal Journal. Oct. 4. 10 cts.

Street Planning and Construction in Bexley. Care in selecting and enforcing proper specifications secures good results. Bituminous pavements of various kinds. Concrete pavement with integral curb. Rounded brick gutters. Comparative costs of different pavements. By Charles Carroll Brown. 10 ills. 3,500 words. Municipal Journal. Oct. 4. 10 cts.

Construction in West Kentucky. Over half million dollars now being spent by eight western Kentucky counties in highway construction and improvements. 800 words. Southern Good Roads. October. 10 cts.

Highway Work in Sheffield. Outline of the work done during the past year. 2,000 words. The Surveyor. Oct. 12. 40 cts.

Road Work in Broward County, Fla. By H. C. Davis, County Engineer. 1,000 words. Southern Good Roads. Oct. 10 cts.

Convict Labor:

Prison Labor on County Road Work in Ohio. 500 words. Engineering and Contracting. Oct. 3. 10 cts.

Finance and Cost:

Cost Keeping Records for Road Construction and Maintenance in the State of Washington. System for recording cost data was prepared by joint committee and will be used on all state road work. 8 ills. 1,500 words. Engineering and Contracting. Oct. 3. 10 cts.

Highway Financing in Texas in Need of Reform. County road improvement procedure is example of extravagant methods of paying for work. By R. L. Morrison. 1,000 words. Engineering News-Record. Oct. 4. 15 cts.

Road Building Serial Bonds Save Money. Tables and diagrams show that sinking fund and annuity methods cost taxpayers many millions. By M. O. Eldridge. 5 ills. 4,000 words. Southern Good Roads. Oct. 10 cts.

Grade Crossings:

Railroad Grade Crossings Within Municipalities. From a paper by Max Thelen. 3,000 words. Good Roads. Oct. 27. 10 cts.

Grading:

Excavating in Shallow Cut. Keystone excavator removes 15 inches of road and loads it into motor trucks. 500 words. Municipal Journal. Oct. 4. 10 cts.

Steam Shovel in Street Excavation. 1 ill. 250 words. Municipal Journal. Oct. 25. 10 cts.

Granite Block:

Grouted Granite Block Laid Under Congested Traffic Conditions. Paving of Dewey Square, Boston, in front of an extremely busy railway terminal presents special problems. 2 ills. 1,000 words. Engineering News-Record. Oct. 11. 15 cts.

Legal:

New Highway Legislation in Arkansas. Laws enacted in 1917. 4,700 words. Good Roads. Oct. 20. 10 cts.

Highway Legislation in New York. Road laws passed during 1917 session of the legislature. 5,000 words. Good Roads. Oct. 27. 10 cts.

Macadam:

Stone-Gravel Road Proves Its Usefulness in Michigan. State highway departments specifications also permit use of slag for base and surfacing. By D. A. Thomas. 1,500 words. Engineering News-Record. Oct. 11. 15 cts.

Machinery:

Modern Machinery in Road Building. Various types of steam and gasoline driven machines are discussed. 6 ills. 1,600 words. Better Roads and Streets. Oct. 15 cts.

Machinery in Macadam Construction. Description of complete outfit used on a job in Ohio. 1,500 words. Municipal Journal. Oct. 25. 10 cts.

Maintenance:

Maintaining Macadam Roads in Richmond. How a small city maintains macadam streets by surface treatment with oil and keeping up small repairs. 1,600 words. Municipal Journal. Oct. 11. 10 cts.

Road Maintenance. By W. W. Crosby. 2,500 words. Better Roads and Streets. Oct. 15 cts.

Tolls for Road Maintenance Collected in Virginia. 700 words. Engineering News-Record. Oct. 11. 15 cts.

Earth Road Maintenance Handled by Contract in Kentucky County. By C. S. Bennett. 600 words. Engineering News-Record. Oct. 18. 15 cts.

Care of the Roadside. By R. E. Henry, Bureau of Public Works, Manila. 1,600 words. Better Roads and Streets. Oct. 15 cts.

Miscellaneous:

Work of the Road Board. Abstract of the seventh annual report on expenditures and construction of roads and bridges. 3,000 words. The Surveyor. Sept. 21. 40 cts.

Constructing Concrete Curbs for Asphalt Roads. 1 ill. 1,000 words. Municipal Engineering. Oct. 25 cts.

Suggestions for Paving Parkway Drives and Boulevards. Bituminous carpet on concrete base advocated; admixture of mineral dust with bitumen favored. By S. Whinery. 1,500 words. Engineering News-Record. Oct. 18. 15 cts.

Road Markers. A simple and cheap marker made of concrete. 1 ill. 250 words. Municipal Journal. Oct. 18. 10 cts.

Highways Designated by Markers on Bridges and Culverts. 3 ills. 300 words. Engineering and Contracting. Oct. 3. 10 cts.

Instructions of Kentucky Department of Public Roads for Making Road Surveys and Estimates. 3,000 words. Engineering and Contracting. Oct. 3. 10 cts.

Improving the Curves of Ohio Roads. Work being done by Ohio Highway Department. 600 words. Municipal Journal. Oct. 11. 10 cts.

Oiling:

Oiled Earth Roads in Illinois. Method of treatment, kind of material, and results obtained. By B. H. Piepmeier. 4 ills. 3,000 words. Good Roads. Oct. 6. 10 cts.

Charts for the Use of Road Oiling Inspectors. To facilitate the solution of the ordinary problems connected with road oiling work, four hand charts have

been prepared. By Earle Glass. 4 ills. 500 words. Canadian Engineer. Oct. 4. 15 cts.

Sand:

Sand Road Experiments in Wisconsin. State Highway Commission is experimenting with the use of hay or straw and a bituminous binding material. By H. J. Kuelling, Assistant to State Highway Engineer. 1 ill. 1,500 words. Municipal Journal. Oct. 25. 10 cts.

State:

What Type of Road to Build in Kansas. From an address by W. S. Gearhart, State Highway Engineer. 2,200 words. Good Roads. Oct. 6. 10 cts.

Highway Problems in New York State. By H. E. Breed. 2,500 words. Good Roads. Oct. 6. 10 cts. 3 ills. 4,000 words. Oct. 13. 10 cts. 2,200 words. Oct. 20. 10 cts.

Road and Bridge Construction in Iowa During the Past Four Years. 1,000 words. Engineering and Contracting. Oct. 13. 10 cts.

Pennsylvania Will Build Only Heavy Traffic Highways. State highway department will concentrate efforts on 3,300 miles of inter-county routes with city pavement surfacing. 1,000 words. Engineering News-Record. Oct. 11. 15 cts

States Spent $288,000,000 on Roads and Bridges in 1916. Office of public roads issues figures showing a mileage of 2,455,761 for rural routes. 2,500 words. Engineering News-Record. Oct. 11. 15 cts.

Permanent Roads Transform Florida. Types of paving laid. 3 ills. 1,000 words. Southern Good Roads. Oct. 10 cts.

The Roads of Maryland. From an address by Henry Shirley before the Southern Commercial Congress. 1,000 words. Good Roads. Oct. 20. 10 cts.

Washington State Road Work. From a paper by R. L. Sparger. 3,000 words. Good Roads. Oct. 13. 10 cts.

Outstanding Features of the Work of Various State Highway Departments for 1917. Discusses the work in Iowa, Virginia, North Carolina, Texas, Nebraska, Delaware, Oklahoma, Nevada, Mississippi, Illinois, South Dakota, West Virginia and Indiana. 3 ills. 6,000 words. Municipal Engineering. Oct. 25 cts.

Traffic and Traction:

Influence of Road Surface on Tractive Resistance. Results of tests in California. 750 words. Engineering and Contracting. Oct. 3. 10 cts.

Recent Tests of Road Traction. Results of California experiments. 1,600 words. Better Roads and Streets. Oct. 15 cts.

Heavy Traffic for Roads and Roads for Heavy Traffic. 1,100 words. Good Roads. Oct. 6. 10 cts.

Weight and Amount of Traffic on Iowa Country Roads. Interesting statistics from recent traffic census. 700 words. Engineering and Contracting. Oct. 3. 10 cts.

Effect of Modern Traffic Upon Urban Roads and Tramway Tracks. The first of two articles. By E. W. Cockerlyne. 3,000 words. The Surveyor. Sept. 28. 40 cts.

The Effect of Modern Traffic Upon Urban Roads and Tramway Tracks. The second of two articles. By E. W. Cockerlyne. 3,000 words. The Surveyor. Oct. 5. 40 cts.

SEWERAGE, DRAINAGE AND SANITATION.

Activated Sluge:

Activated Sludge Process for Stock Yards. General description of plant proposed for treating sewage from Chicago stock yards district. Estimated cost of construction and operation. 3,000 words. Municipal Journal. Oct. 18. 10 cts.

Removing Activated Sludge. Information concerning recent experiments at Milwaukee. 750 words. Municipal Journal. Oct. 18. 10 cts.

Various Methods of Dewatering Activated Sludge. By Edward Bartow. 1,800 words. Municipal Engineering. Oct. 25 cts.

Comparative Tests of Air Diffusers and Devices for Dewatering Activated Sludge. From a paper by Edward Bartow. 2 ills. 3,000 words. Canadian Engineer. Oct. 18. 15 cts.

Associations:

Abstract of Papers at American Public Health Association Meeting: State Public Health Laboratories in Time of War, by Henry Albert; Activated Sludge Promises to Solve Packinghouse Wastes Problem, by Langdon Pearse; Effect of the War on Garbage—Production and Disposal, by I. S. Osborn; State Health Boards Should Control City Refuse Service, by E. D. Rich. 3,500 words. Engineering News-Record, Oct. 25. 15 cts.

Construction:

Two Toronto Sewers Built on Piles and Timber Bents. Involved problems of shifting dead weights and strengths of sub-structures instead of the usual sewer problems of stationary dead weights and nature of ground traversed. Fill of 215,000 cubic yards was necessary. By W. G. Cameron. 5 ills. 1,800 words. Canadian Engineer. Oct. 4. 15 cts.

Tentative Recommended Practice for Laying Sewer Pipe. Recommendations of Committee of American Society for Testing Materials. 1,000 words. Engineering and Contracting. Oct. 10. 10 cts.

Sewer Construction in Chicago. Contractor's methods employed in laying six by nine-foot to nine-inch sewers, a considerable part in tunnel. Cost details. From a paper by H. R. Abbott. 10 ills. 2,500 words. Municipal Journal. Oct. 11. 10 cts.

Six-Foot Cast Concrete Pipe Safely Rolled a Mile and a Half to Trench Line. A Manila rope hoop just back of bell kept bell from cracking. Steam aided in cold weather curing. Fourteen men cast twenty pipes a day. 6 ills. 1,000 words. The Contractor. Oct. 26. 10 cts.

Construction Plant and Methods Employed in Building the Woodville Avenue Sewer at Toronto. 3 ills. 5,000 words. Municipal Engineering. Oct. 25 cts.

Features of Sewer Construction Work at Elmhurst, Ill., and South Bend, Ind. Using Lock-Joint Sewer Tile. 4 ills. 1,800 words. Municipal Engineering. Oct. 25 cts.

Drainage:

Yardage Outputs Large in Machine Ditch Cleaning. Machines of several types are adaptable to drainage ditch repairs in the Mississippi Valley. By H. P. Whitney. 4 ills. 1,000 words. The Contractor. Oct. 26. 10 cts.

Extensive Use of Concrete Drain Tile By R. O. Hollister. 1,500 words. The Cement Era. Oct. 20 cts.

Levee Construction and Electric Pumping for Reclamation Project. Electrically operated hydraulic dredge and electric pumping station. 4 ills. 2,000 words. Electric Review. Oct. 20. 10 cts.

Hydrated Lime in Drain Tile. By Bela Nagy. 500 words. Concrete. Oct. 20 cts.

Manholes:

Drop Manholes for Sewers. Conditions for which required and characteristics desirable. Open, recess, pipe, channel, cascade and ramp drops. 3 ills. 1,600 words. Municipal Journal. Oct. 18. 10 cts.

Sanitation:

The Practical Application of Modern Sanitation. From address by F. G. Holmes. 3,000 words. The Surveyor. Sept. 21. 40 cts.

Sewers:

Excluding Gasoline from Sewers. Experience in New York. 500 words. Municipal Journal. Oct. 11. 10 cts.

Richmond Constructs Immense Combined Sewer. More than half the city will be served by reinforced concrete sewer 2 miles long. Some heavy roof work required. By C. E. Bolling, City Engineer. 7 ills. 1,000 words. Engineering News-Record. Oct. 4. 15 cts.

Trench Pressures Upon Sewer Pipe. 200 words. Engineering and Contracting. Oct. 10. 10 cts.

Mimico and New Toronto Joint Sewerage System. Details of a combined sewerage system that serves two cities. Basis of agreement. Brush wood used as filtering media. Description of pumping equipment and sewage filtering apparatus. 9 ills. 1,500 words. Canadian Engineer. Sept. 27. 15 cts.

Treatment:

To Meet State Laws Austin Proposes Thoroughgoing Sewage Works. Automatically controlled pumps, Imhoff tanks, sludge-drying beds, four dosing tanks, trickling filters and liquid-chlorine disinfecting apparatus are included in design. By John H. Gregory. 4 ills. 3,000 words. Engineering News-Record. Oct. 18. 15 cts.

Sewage Disposal at Sheffield. Efficient treatment with primary system of filtration. 1,500 words. The Surveyor. Oct. 12. 40 cts.

WATER SUPPLY.

Accounting:

Some Notes on Deficiencies in Water Accounts. From a paper by C. G. Henzell, Waterworks Engineer, Leeds. 4,000 words. The Surveyor. Oct. 12. 40 cts.

Associations:

Municipal Waterworks Association. Report of sixth annual meeting held at London. 6,000 words. The Surveyor. Oct. 12. 40 cts.

Construction:

The Cost of Laying Water Mains. Detailed figures of costs in Saginaw and Chicago. Pipe, lead, labor, cartage, etc. 2 pages. Municipal Journal. Oct. 4. 10 cts.

Methods and Cost of Constructing a Forty-eight-Inch Submerged River Crossing at Minneapolis, Minn. 2,400 words. Engineering and Contracting. Oct. 10. 10 cts.

Method and Cost of Rebuilding Filter Beds at Cincinnati Filtration Plant. 1,600 words. Engineering and Contracting. Oct. 10. 10 cts.

Laying Steel Water Main in St. Louis. Thirty-six inch pipe line delivering direct from pumping station to low service reservoir. Machinery used for excavating and backfilling. Detailed cost of work. Machine trenching at house services. By W. E. Hardenburg. 4 ills. 1,700 words. Municipal Journal. Oct. 11. 10 cts.

Extensive Waterworks Reconstruction at Wheaton, Ill. 4 ills. 1,100 words. Municipal Engineering. Oct. 25 cts.

Year Saved by Using Excavated Rock to Line Tunnel. Pneumatic concrete plants and use of stone secured from tunnel makes progress rapid in Chicago water tunnel. 1,500 words. Engineering News-Record. Oct. 4. 15 cts.

Electrolysis:

Electrolysis in Underground Water Pipes. From a paper by J. W. Ivy. 3,200 words. Canadian Engineer. Oct. 11. 15 cts.

Filtration:

Rapid Sand Filtration Recommended for Catskill Water Supply. 1,000 words. Engineering News-Record. Oct. 25. 15 cts

Flow:

Effect of Mouthpieces on Flow of Water Through Submerged Short Pipe. 800 words. Engineering and Contracting. Oct. 10. 10 cts.

Joints:

Experiences with Leadite Joints at Windsor, Conn. 700 words. Engineering and Contracting. Oct. 10. 10 cts.

Miscellaneous:

Reducing the Peak Load by a Remotely Controlled Water Works Pumping Unit. 2 ills. 1,000 words. Engineering and Contracting. Oct. 10. 10 cts.

Cement Gun Seals Well Against Seepage of Ground Water. 1 ill. 500 words. Engineering and Contracting. Oct. 10. 10 cts.

Recovering Irrigation Water. Los Angeles constructs long infiltration gallery in river bed. Novel method of constructing reinforced concrete conduit and gallery. By C. W. Geiger. 3 ills. 1,500 words. Municipal Journal. Oct. 18. 10 cts.

Burning Off a Standpipe. 2 ills. 200 words. Municipal Journal. Oct. 25. 10 cts.

Operation:

Methods Used at Cincinnati Filtration Plant for Isolating and Identifying Bacillus Coli. 1 ill. 1,000 words. Engineering and Contracting. Oct. 10. 10 cts.

Pipes:

Use of Concrete Pipe for Underwater Pipe Lines. By Duncan Cameron. 800 words. The Cement Era. Oct. 20 cts.

Pipe Staves Creosoted Without Loss of Strength. Douglas fir treated at low temperature and given crushing test. Preservative does not give taste to water. By O. P. M. Goss. 1 ill. 1,800 words. Engineering News-Record. Oct. 4. 15 cts.

Prices:

Present Prices of Water Service Materials. 1,100 words. Engineering and Contracting. Oct. 31. 10 cts.

Reservoirs:

Reservoir and Standpipe Combined. Designs of an interesting structure at Hull, England, with 300,000 gals. capacity at ground and 100,000 gals. 60 feet high. By G. A. Couper. 1 ill. 1,600 words. Concrete. October. 20 cts.

Treatment:

Ultra Violet Sterilization at Henderson. Operating results in first municipal plant of the pressure type. 1,000 words. Municipal Journal. Oct. 4. 10 cts.

The Use of Copper Sulphate. Suggestions concerning its application to reservoirs to destroy algae. Prompt application is desirable. Relation to destruction of fish. 1,200 words. Municipal Journal. Oct. 4. 10 cts.

Valuation:

Purposes Should Govern Water Works Valuations. Original cost reproduction cost less depreciation and market value are all thought to have their applications. By J. W. Ledoux. 1 ill. 3,400 words. Engineering News-Record. Oct. 4. 15 cts.

A Discussion of the Fundamental Principles of Water Works Valuation. By J. W. Ledoux. 12,000 words. The Journal of the Engineers' Club of Philadelphia. October. 50 cts.

Reasonable Limits of Accuracy for Valuation of Water Utility Properties. By A. F. Brewer. 1,600 words. Engineering & Contracting. Oct. 10. 10 cts

LIGHTING AND POWER.

Power:

Production of Electricity by Steam Power. Abstract of an address by Alex. Dow. 3,500 words. Electrical Review. October. 10 cts.

Traveling Water Screens for Condenser Intakes of Power Stations. Construction features. 12 ills. 5,000 words. Electrical Review. Oct. 25. 10 cts.

The Hazards of Domestic Electrical Appliances. From a paper by W. J. Canada. 7,000 words. National Fire Protection Association Quarterly October. 50 cts.

The Pennsylvania Electric Code. By John P. Jackson. 27 pages. Journal of the Engineers' Club of Philadelphia. October. 50 cts.

Street Lighting:

Practical Features of Street-Lighting Contracts. Points to be observed in negotiations between municipalities and utilities with special attention to securing and maintaining the best public relations. By James R. Cravath. 5,000 words. Electrical World. Oct. 13. 10 cts.

Redding's New Lighting System. Described in a paper presented by E. A. Rollson, City Electrician. 800 words. Good Roads. Oct. 13. 10 cts.

Concrete in Street Lighting Field. Describes concrete posts and standards. By Arthur J. Sweet. 2 ills. 1,100 words. Cement & Engineering News. October 20 cts.

FIRE.

New Britain Fire Department Undermanned. Report of National Board of Fire Underwriters. 600 words. Fireman's Herald. Oct. 27. 5 cts.

High Pressure Fire Protection System of Toledo, Ohio. 1 ill. 1,000 words. Engineering and Contracting. Oct. 10. 10 cts.

The Drill School and Drill Tower of the Hartford Fire Department. 1 ill. 1,000 words. Fire and Water Engineering. Oct. 31. 10 cts.

Fire Protection in a large Manufacturing Plant. Protective equipment and methods of the General Electric Company's Schenectady Plant. 8 ills. 1,200 words. Fire and Water Engineering. Oct. 31. 10 cts.

How the Conflagration Hazard May Be Reduced. Some explanations of the causes of fires and suggestions as to reduction of the present large losses. From a paper by F. H. Wentworth. 2,500 words. Fire and Water Engineering. Oct. 31. 10 cts.

MOTOR VEHICLES.

Improving Electric Vehicle Performance During Winter. Use of anti-skid devices may save delays. Inherent cold-weather reduction of battery capacity may readily be largely overcome. By Kennedy Rutherford. 3,000 words. Electrical Review. Oct. 25. 10 cts.

Municipal Motor Vehicles. Cost and work done by electrics in Nottingham and Newcastle. 1,000 words. The Surveyor. Sept. 7. 40 cts.

Studs on Traction Engine Wheels. Information from four road surveyors of England. 1,000 words. The Surveyor. Aug. 31. 40 cts.

Poor Economy in Towing Horse Wagons. Trailers are more satisfactory. 2 ills. 1,000 words. Better Roads and Streets. Oct. 15 cts.

Compressed Coal Gas for Motor Lorries. Results of the recent experiments in Glasgow. 2,500 words. The Surveyor. Sept. 7. 40 cts.

Steel Motor Truck Bodies for Every Purpose. Two main types with many variations for all sorts of work are offered. 9 ills. 1,500 words. The Commercial Vehicle. Oct. 15. 20 cts

STREET CLEANING AND REFUSE DISPOSAL.

Refuse:

Toronto Incinerator Exceeds Burning Capacity Guarantee by 133 Per Cent. Description of plant and result of test. 2,200 words. Municipal Engineering. Oct. 25 cts.

War Time Economy at Horsforth. How refuse is utilized, using flue dust as a disinfectant; utilizing waste paper. 1,100 words. The Surveyor. Oct. 12. 40 cts.

Collection and Disposal of Refuse and Nightsoil in Singapore. Description of conditions and of kinds of refuse collected. Tools and appliances; system of collecting and disposing. By W. K. Symonds, Conservancy Supt. 4,000 words. The Surveyor. Sept. 7. 40 cts.

Camp Wastes Yield Large Revenue to the Government. Plan under which garbage and other wastes at nineteen camps have been sold. 1,500 words. Engineering News-Record. Oct. 18. 15 cts.

Snow Removal:

Proposed Plan of Cooperation in Snow Removal in New York City. 800 words. Good Roads. Oct. 13. 10 cts.

Street Cleaning:

Philadelphia Street Cleaning. By F. C. Perkins. 3 ills. 1,500 words. Better Roads and Streets. Oct. 15 cts.

Cleansing Work in Glasgow. Cost of operating street sweeping machine. 300 words. The Surveyor. Sept. 21. 40 cts.

Cost of Street Cleaning at San Diego, with Vacuum Cleaners. 400 words. Engineering and Contracting. Oct. 3. 10 cts.

Ottawa Scavenging Wagons. Description of special type adopted. 3 ills. 800 words. Canadian Engineer. Oct. 25. 15 cts.

BRIDGES AND DAMS.

Economics of Bridge Design. From a lecture by J. A. L. Waddell. 4,000 words. Canadian Engineer. Oct. 11. 15 cts

Old Steel Spans Used for Traffic and Working Platform During Construction of Arch Bridge Beneath. By R. W. Gearhart, Highway Engineer, Buchanan County, Ia. 5 ills. 1,600 words. Engineering and Contracting. Oct. 24. 10 cts.

Fills Versus Viaducts for City Streets. Comparative costs of various types of structures. From a paper by R. E. Cushman. 1 ills., 3,000 words Engineering and Contracting. Oct. 24. 10 cts.

Multiple Arch Dam Design. The most practical and economical span is about 40 feet and all spans should be the same. By L. Jorgensen. 3 ills., 2,200 words. Canadian Engineer. Oct. 4. 15 cts.

CITY PLANNING.

The Housing Problem and its Economic Solution. State assistance to private enterprises in house building after the war. 4,000 words. The Surveyor. Sept. 7. 10 cts.

Scottish Housing. The report of the Royal Commission and its recommendation. 4,000 words. The Surveyor. Oct. 12. 40 cts.

GOVERNMENT AND FINANCE.

Non-Assessable Property and Street Improvements. Discussion in a paper by M. B. Cowden, City Engineer of Harrisburg, Pa. 600 words. Engineering & Contracting. Oct. 3. 10 cts.

The Cleveland Plan for Assessing Repaving Costs. 500 words. Engineering and Contracting. Oct. 3. 10 cts.

Accounting in Municipalities. From an address by D. C. Scribner. 4,000 words. Pacific Municipalities. Oct. 25 cts.

The Commission Form of Government for Counties. From an address by N. W. Durham. 1,500 words. Good Roads. Oct. 6. 10 cts.

Police Power Over and Control of Streets. By W. P. Butcher. 2 000 words. Pacific Municipalities. Oct. 25 cts.

Cooperative Buying of Road and Bridge Material by Iowa Counties. Cooperative buying under standard specifications is contemplated by supervisors of 99 Iowa counties. 1,500 words. Engineering and Contracting. Oct. 3. 10 cts.

Centralized Engineering Succeeds in Wisconsin. A dozen scattered state engineering bureaus were consolidated under a state engineer in 1915. Dual control of bureaus practicable. By S. J. Williams. 2,500 words. Engineering News-Record. Oct. 25. 15 cts.

Comparisons of Various By-Laws Covering Flat Slab Concrete Buildings, with Actual Tests. Codes compared give fairly similar results under actual conditions and when reduced to a common basis. Tests made on the Wm. Davies Building, Toronto. By W. W. Pearse, City Architect and Superintendent of Buildings. 10 ills. 3,000 words. Canadian Engineer. Oct. 18. 15 cts.

MATERIALS OF CONSTRUCTION.

Economical Proportions for Portland Cement Mortars and Concrete. Eight conclusions reached. From a paper before the American Society for Testing materials. By J. A. Ellis. 3 ills. 2,000 words. Canadian Engineer. Oct. 4. 15 cts.

Plain Concrete in Sea Water Must Be Protected Against Abrasion. Hard concrete surface is a carbonate which is safe from sea water attack. Softer interior with lime hydroxide is readily dissolved if exposed. By R. J. Wig and L. R. Ferguson. 19 ills. 2,999 words. Engineering News-Record Oct. 4. 15 cts.

Reinforced Concrete in Sea Water Fails from Corroded Steel. Percolation of salt water or salt air to reinforcing steel causes rusting and failure. Remedies are difficult to find. By R. J. Wig and L. R. Ferguson. 7 ills. 4,500 words. Engineering News-Record. Oct. 11. 15 cts.

Selection of Material for Sea Water Concrete. Any standard portland cement may be considered safe as may also sea water gaging. Great care should be exercised in choosing aggregates. By R. J. Wig and L. R. Ferguson. 5 ills. 3,500 words. Engineering News-Record. Oct. 18. 15 cts.

Good Workmanship Necessary to Make Sea Water Concrete Safe. Correct proportions, judicious use of water, tight forms, a good contractor and efficient inspection are needed to bring concrete to proper condition to resist sea water action. By Rudolph J. Wig and Lewis R. Ferguson. 6 ills. 4,000 words. Engineering News-Record. Oct. 25. 15 cts.

Solving the Crazing Problem. Valuable discussions on the prevention and removal of hair checks in concrete construction. By Harvey Whipple. 8,000 words. Concrete. October. 20 cts.

Precautionary Measures for Concreting in Freezing Weather. By J. A. Stalfort. 2,000 words. The Cement Era. October. 20 cts.

Eight Men Tend Twin Mixer Plant. Thirty to forty yards of concrete put in forms every hour by ten men. Counterweight chute hung from main guy. 5 ills. 1,200 words. The Contractor. Oct. 26. 10 cts.

Notable Concrete Swimming Pools in California. By H. F. Stoll. 7 ills. 2,000 words. The Cement Era. Oct. 20 cts.

MISCELLANEOUS.

The Law in Regard to the Culverting of Streams. Decisions in England in regard to damages caused by constructing private culverts. 1 ill. 3,000 words. The Surveyor. Sept. 7. 40 cts.

Notes on Prepared Paints for Metal Surfaces. From a paper by H. A. Gardner. 2,000 words. Engineering and Contracting. Oct. 24. 10 cts

Detinning. The Wadsworth installation. 1 ill. 200 words. The Surveyor. Oct. 12. 40 cts.

Effect of the War on Enrollment in Civil Engineering Departments of American Colleges. 2 pages. Engineering & Contracting. Oct. 31. 10 cts.

Public Abattoirs. From a paper by R. L. Honey. 3,000 words. The Surveyor. Oct. 5. 40 cts.

Building Prices on Public Work During Past Two Months. Contractors' figures on construction undertakings in various sections of the United States. 12,000 words. Engineering & Contracting. Oct. 31. 10 cts.

Dayton Flood Protection Essentially a Machinery Job. Will cost $10,000,000. Five earth dams and seven channel sections included. 1,500 words. The Contractor. Oct. 26. 10 cts.

Specifications for Watertight Embankments Made by Three Different Processes. Specifications were drawn for the retarding reservoirs of the Dayton, Ohio, flood prevention project. 4,500 words. Engineering & Contracting. Oct. 17. 10 cts.

Special Features of the Miami Conservancy Contracts. Flood-prevention work to be placed under contract next month will cost $10,000,000. Five earth dams and seven sections of channel included. 7 ills. 2,000 words. Engineering News-Record. Oct. 18. 15 cts.

(*Continued on page* 504)

NEWS OF THE SOCIETIES

Calendar of Meetings.

Nov. 14-16.—FIRE MARSHALS ASSOCIATION OF NORTH AMERICA. Annual convention, New Orleans, La. Secretary, W. M. Campbell, New Orleans, La.

Nov. 15-16.—ASSOCIATION OF URBAN UNIVERSITIES. Annual meeting, Pittsburgh, Pa. Secretary, Frederick B. Robinson, City College, New York, N. Y.

Nov. 19-20.—NATIONAL PAVING BRICK MANUFACTURERS ASSOCIATION. Conference of Paving Brick Industry, Cleveland, O. Secretary, Will P. Blair, Engineers Building, Cleveland, O.

Nov. 19-23.—AMERICAN PRISON ASSOCIATION. Annual Prison Congress, New Orleans, La. Secretary, Joseph P. Byers, 702 Empire Building, Philadelphia, Pa.

Nov. 19-24.—CITY MANAGERS' ASSOCIATION. Annual meeting, Detroit, Mich. Secretary, W. L. Miller, City Manager, St. Augustine, Fla.

Nov. 20-21.—ASSOCIATION OF GOVERNMENTAL RESEARCH AGENCIES. Third annual meeting, Detroit, Mich. Secretary, C. O. Dustin, Statistical Bureau, Red Cross War Council, Washington, D. C.

Nov. 20-23.—PLAYGROUND AND RECREATION ASSOCIATION OF AMERICA. Recreation Congress. Secretary, H. S. Braucher, 1 Madison Ave., New York, N. Y.

Nov. 21-24.—NATIONAL MUNICIPAL LEAGUE. Twenty-third annual meeting. Hotel Statler, Detroit, Mich. Secretary, Clinton Rogers Woodruff, 703 North American Bldg., Philadelphia, Pa.

Nov. 25-Dec. 1.—ATLANTIC DEEPER WATERWAYS ASSOCIATION. Annual convention, Miami, Fla. Secretary, W. H. Schoff, Crozer Building, Philadelphia, Pa.

Dec. 4-6.—AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS. Annual meeting, Richmond, Va. Acting secretary, H. M. Berry, Chapel Hill, N. C.

Dec. 26-29.—AMERICAN POLITICAL SCIENCE ASSOCIATION. Annual meeting, Philadelphia, Pa. Secretary, Clinton J. Swartz, Trenton, N. J.

Jan. 3, 4.—NEW JERSEY STATE LEAGUE OF MUNICIPALITIES. Annual convention, Trenton, N. J. Secretary, Clinton A. Swartz, Trenton, N. J.

Jan. 15-17.—VIRGINIA GOOD ROADS ASSOCIATION. Seventh annual convention, Richmond, Va. Secretary, C. B. Scott, Richmond, Va.

Feb. 6-13.—FIRST CHICAGO CEMENT MACHINERY AND BUILDING SHOW. Supersedes annual Chicago Cement Show. Held at the Coliseum, under direction of the National Exhibition Co.

March 17-24.—PAN-AMERICAN CONGRESS ON CHILD WELFARE. Montevideo, Uruguay. Secretary, Edward N. Clopper, 105 East 22d Street, New York, N. Y.

American Civic Association.

The American Civic Association opened its thirteenth annual convention at the Planters Hotel, St. Louis, Oct. 22, with an attendance of more than 200 delegates, representing about 100 American cities.

The convention was welcomed by John H. Gunlach, presiding officer; Lieutenant-Governor Wallace Crossley; Louis P. Aloe, president of the board of aldermen; J. Lionberger Davis, president of the chamber of commerce, and Miss Jessie L. Moller. Horace McFarland, president of the society, responded.

President J. L. Davis, of the St. Louis chamber of commerce, in welcoming the delegates, declared that many of those things which have been believed in and hoped for are coming. He denied that there is any conflict between business and philanthropy or between commerce and civics, as all of these things which sometimes have been though of separately go hand in hand. The best business men of today, he said, realize that their success rests upon sound community life.

Louis P. Aloe, president of the St. Louis board of aldermen, urged the delegates to analyze the city, give it credit where it is doing well, and tell it of its shortcomings in order that it might be helped in its struggles to become a better community in which to live.

President J. Horace McFarland, of Harrisburg, Pa., quoted President Wilson in one of his proclamations, that "war must not destroy civic efficiency." He suggested that this might well be used as a text throughout the country today.

Secretary Richard B. Watrous, of Washington, D. C., in his annual report, said there was no diminution of interest in the association, but on the other hand, there has been a gain in membership.

Dr. John Nolen, of Cambridge, Mass., with a stereopticon showed views of industrial housing in both American and English communities. One of these was of housing erected in England to accommodate munitions workers. These houses have been erected of a permanent character and after the war will be converted into cottages of an attractive type.

Difficulties surrounding the construction of cantonments for the national army and national guard were explained Tuesday by Maj. W. A. Starret, U. S. R., formerly a New York architect. Maj. Starret, who was graduated last summer from an Officers' Reserve Corps camp, illustrated his address with moving pictures of the various cantonments during construction.

Limited to a period of six weeks in which to build these camps, a majority of which were planned as permanent camps, Maj. Starret pointed out that the work presented obstacles that threatened to upset the government's entire plans. Labor and materials had to be hauled from different parts of the country to the camp sites, which in many instances consisted of farm lands under cultivation. Theoretical plans of the War Department for the arrangement of barracks and other details had to be abandoned at short notice, while the contractor and architect went on the field and drew their plans to conform to the situation.

Despite these handicaps and the fact that it was necessary to haul 50,000 carloads of materials half way across the continent to many of the camps, the buildings went up like magic, Maj. Starret related.

Huge storage depots, covering 400 acres and with sufficient trackage to accommodate 35 miles of cars, are contemplated by the government for eastern shipping points to relieve the present congestion due to shipments of supplies and ammunition to the troops abroad, said Maj. Starret. These depots will cost $7,000,000.

Maj. Starret attended the convention by special permission of Secretary of War Baker.

The value of improved living conditions and social service work in large industrial centers was outlined by Miss Marguerite Walker Jordan, director of welfare work in the coal mining district around Fairmount, W. Va.

"Garden cities," consisting of model homes erected by large industrial concerns from special funds and rented to workers at a moderate rate, have enabled the wages earners in these districts to become thrifty and better workers, Miss Jordan pointed out.

"This plan of providing cheap and comfortable homes for the working classes," she continued, "must not have the slightest indication of philanthropy or charity on the part of the employer, or the workmen will not accept it. If the men feel they are paying a fair rental and that the employer is realizing a fair return on his investment, the former is satisfied. The plan is working successfully at Kistler, W. Va., where nearly 100 houses, each provided with a garden space, were erected amid beautiful surroundings for the employes of a brick plant."

The convention was presided over Tuesday by George B. Dealey, of Dallas, Tex. A luncheon was held at the City Club at noon and a tour of the city in automobiles was on the delegates' afternoon program.

The officers of the association were re-elected. They are: J. Horace McFarland, Harrisburg, Pa., president; Dr. John Nolen, Cambridge, Mass., vice president; Karl V. S. Howland, New York, treasurer, and Richard B. Watrous, Washington, D. C., secretary.

Wednesday a paper by Irving C. Norwood, secretary of the Greater Davenport (Iowa) Association, told of annual campaigns conducted there since 1913 for the improvement of home gardens and to induce the business section of the city to utilize window boxes. In 1913 not more than one home out of twenty had such gardens, but today not more than one out of twenty is without such gardens and beautiful lawns and the first year the business men responded with one and one-half miles of window boxes, which has increased each year. The co-operation of these 50,000 people has resulted in increased property values, a cleaner and healthier city, almost universal home ownership and it has been a potent factor in stimulating civic pride.

J. Horace McFarland, f Harrisburg, Pa., told of inviting the heads of the traction and electric power corporations to break bread with the civic

league of his town, and by persuasion inducing them to so locate their institutions that they would be most valuable to the citizenship and at the same time enhance the attractiveness of Harrisburg.

Professor F. N. Evans, of the University of Illinois, and Harold A. Caparn, of New York city, stressed the influence of environments, declaring that mental impressions moulded tastes and either militated against or served to improve individual and collective health of a city.

J. C. Nichols, of Kansas City, who has successfully promoted one of the largest suburban residential districts in America, emphasized the value of environments and illustrated his points with a number of concrete examples. He dwelt at considerable length upon the beneficient influence of properly applying the principles of city planning, and declared that if Kansas City had been as well planned as have the parks and boulevards, real estate would have been worth from 25 to 50 per cent more and investments could be made with better assurance that values would remain stable.

Prof. Frank A. Waugh, of the landscape department of the Massachusetts Agricultural College, who for six months has been engaged in a survey of natural parks and resources for the government, enumerated the various benefits both to communities and individuals consequent upon the developing and preservation of natural heritages.

Practically all of the speakers advocated the establishment of a park in the Ozarks, it being the most acceptable plan to locate this park under the joint supervision of Arkansas and Missouri.

Milton Wend, of the Bureau of Standards, Washington, D. C., spoke on "Combining Economy with Beauty in Street Lighting." He told of the single standard street lights of the nation's capital, which have been largely copied throughout the country. For either the small or the large city he recommended the single light instead of the group or cluster system. The former, he said, looks better and from an economical standpoint has many advantages, as well as being more efficient. Fourteen feet should be the minimum for the height of street lights and sixteen feet is better. Less height than that would present a glaring effect upon the show windows and objects in the street, such

(Continued on page 502.)

PROBLEMS CITIES ARE STUDYING
WITH EXPERTS

Grant county, Marion, Ind., has let contracts for the construction of a BRIDGE planned by Daniel B. Luten.

In making a number of STREET IMPROVEMENTS, Enterprise, Ala., has the consulting engineering services of Arthur Pew.

Riverdale, Ill., is constructing SEWERS, following the preparation of plans and specifications by the engineer, H. L. Emerson.

A VIADUCT to be constructed by Carbondale, Pa., is being planned by the consulting engineering firm of Peck Bros.

The Drainage District of Osage county, Quenemo Kan., is contemplating extensive DRAINAGE IMPROVEMENTS. The engineer to prepare plans and specifications is Clarke E. Jacoby.

A number of plans for the improvement of the municipal ELECTRIC LIGHTING SYSTEM of Grand Rapids, Mich., have been recommended by the city's consulting engineer, Prof. John C. Parker.

The city of Louisville, Ky., with the aid of a fund raised by the Woman's City Club, has had a thorough investigation of the REFUSE DISPOSAL PROBLEM made by the consulting engineer, Samuel A. Greeley.

A SEWAGE DISPOSAL PLANT and a PUMPING STATION are to be built by Stockton, Cal. Plans are in course of preparation by the consulting engineering firm of Haviland & Tibbitts.

Hopkins, Minn., is to construct a SEWER SYSTEM. Plans and specifications for the improvement were prepared by the engineer, J. F. Druar.

STREET IMPROVEMENTS are to be made by Rockport, Mo., following the preparation of plans and specifications by the engineers, Bruce & Standeven.

In extending its WATER MAINS, the village of Glenellyn, Ill., has the engineering services of Geo. A. Nelson.

Hennepin county, Minneapolis, Minn., has let a contract for ROAD IMPROVEMENT. The consulting engineers for the work were Hunt & Lewis.

The construction of a municipal ELECTRIC LIGHT PLANT is contemplated by Everett, Wash. The council has retained the consulting engineering firm of Burns & McDonnell to investigate and prepare plans.

The SEWAGE DISPOSAL PLANT of Salem, O., having proved inadequate and inefficient in operation, the city has engaged the W. J. Sherman company as consulting engineers to investigate conditions and report on necessary improvements.

Extensive PAVING IMPROVEMENTS, including reinforced concrete, are to be made by the city of Wyandotte, Mich. Mason L. Brown & Sons have been retained as consulting engineers to draw up plans and specifications.

PERSONALS

Clarke Arthur, has been appointed chief of the Camas, Wash., fire department.

Hemphill, H. D., has been appointed chief of the Coleman, Tex., fire department.

Hurd, E. C., has been appointed city engineer of Havelock, Neb., succeeding L. S. Biddlecom, who resigned recently.

Parker, W. E., is now superintendent of the city street department of Anniston, Ala., succeeding Sam Smith, who is retained as first assistant to Mr. Parker.

Risley, S. J., has been appointed chief of the Huntingdon Park, Cal., fire department.

Wagner, G. J., was recently appointed city engineer of Grand Rapids, Mich.

Windrow, R. J., former County Engineer of McLennan County, Texas, has been appointed by Governor Hobby as a member of the State Board of Water Engineers, succeeding James C. Nagle, who resigned recently.

The following mayors have been elected in cities in New York state:

Albany—James R. Watt.
Amsterdam—Seely Conover.
Auburn—Mark L. Koon.
Binghamton—Harry C. Walker.
Buffalo—George S. Buck.
Canandaigua—Fred H. Partridge.
Cohoes—J. S. Calkins.
Corning—George W. Lane.
Dunkirk—James S. Pierce.
Elmira—Harry M. Hoffman.
Fulton—Victor C. Lewis.
Geneva—Reuben H. Gulvin.
Gloversville—Abram Baird.
Hornell—Edward J. Davis.
Ithaca—Frank B. Davis.
Johnstown—Clarence W. Smith.
Kingston—Palmer Canfield, jr.
Lackawanna—John A. Toomey.
Little Falls—Abraham Zoller.
Middletown—Rosslyn M. Cox.
Mount Vernon—Edward F. Brush.
New Rochelle—Fred H. Waldorf.
Olean—Foster Studholme.
Oneida—Ralph Munson.
Oneonta—Andrew E. Cepperley.
Oswego—John Fitzgibbons.
Plattsburgh—Charles A. Barnard.
Port Jervis—Peter C. Rutan.
Poughkeepsie—Ralph F. Butts.
Rochester—H. H. Edgerton.
Rome—H. Clayton Midlam.
Salamanca—Emmet E. Warn.
Saratoga Springs—Harry Pettee.
Schenectady—Charles A. Simon.
Syracuse—Walter R. Stone.
Tonawanda—Fred Koehn.
Troy—C. F. Burns.
Utica—James D Smith.
Watertown—Isaac R. Breen.
Watervliet—Edward W. Joslin.
White Plains—William Weise.
Yonkers—William J. Wallin, jr.

Euston, Pa.—The following city councilmen were elected for 2 years: Dr. Charles Collmar, Dr. B. Rush Field, W. P. Strickland and Fred L. Mebus.

INDUSTRIAL NEWS

Cast Iron Pipe.—Prices remain at the same level after the big drop on all sizes recently announced. Business, however, is dull. Quotations: Chicago, 4-inch, class B and heavier, $53.50; 6-inch, $50.50. New York, 4-inch, class B and heavier, $59.50; 6-inch, $56.50. Birmingham, 4-inch, class B and heavier, $48; 6-inch, $45; class A, $1 extra, all sizes.

The Lee Loader & Body Co., 2343-2350 South La Salle street, Chicago, Ill., has issued some new pamphlets describing and illustrating its line of bodies and auxiliary equipment for motor trucks, including side dumping bodies, end dumping bodies, three-way dumping bodies, asphalt outfits, garbage bodies, section dump bodies, industrial trucks, trailers and semi-trailers, wagon and truck loaders, etc. This literature should prove very suggestive to progressive contractors and public works officials who are seeking to cut down costs and increase efficiency in hauling and handling materials.

The American-La France Fire Engine Co., Elmira, N. Y., has recently rceeived the following orders: Alexandria, Minn., 1 type 40 comb. with Junior pump; Cambridge, Mass., 1 type 12 pumping engine; Duluth, Minn., 1 type 12 pumping engine; El Segunda, Cal., 1 type 12 chemical engine; Glace Bay, N. S., 1 type 12 combination, with Junior pump; Hagerstown, Md., 1 type 31 steamer tractor; Jersey City, N. J., 1 type 31, 75-ft. aerial truck; Nahant, Mass., 1 type 75 pumping engine; Oneonta, N. Y., 1 type 14 combination service truck; Riverside, Cal., 1 type 75 pumping engine; St. Louis, Mo., 2 type 12 pumping engines; Santiago, Chile, 1 type 75 pumping engine; Schenectady, N. Y., 1 type 40 combination with Junior pump; South Manchester, Conn., 1 type 75 combination with Junior pump; Union, N. J., 2 type 12 pumping engines; Port Sheridan, Ill., 1 type 40 combination with Junior pump; Tenafly, N. J., 2 type 75 pumping engines; Vancouver, B. C., 1 type 12 pumping engine; Wausau, Wis., 1 type 75 pumping engine; Monaca, Pa., 1 Brockway combination chemical engine and hose car; Fort Henry, N. Y., 1 Brockway combination chemical engine and hose car; Brigham City, Utah, 1 type 75 pumping engine; Kearny, N. J., 1 type 75 pumping engine; Pittsburg, Kan., 1 type 40 combination; Portland, Ore., 6 type 12 pumping engines; St. Joseph, Mich., 1 type 40 combination with Junior pump; Santa Fe, N. M., 1 type 40 combination; Tokio, Japan, 2 type 40 pumping engines; Topeka, Kan., 1 type 40 combination; U. S. Government—Port Newark, Terminal, 1 type 12 pumping engine; U. S. Government—Panama Canal Zone, 1 type 75 pumping engine.

The Ingersoll-Rand Company, 11 Broadway, New York, N. Y., has issued three new pieces of literature: Form No. 3118, describing and illustrating compressors and vacuum pumps for the extraction of gasoline from natural gas; a leaflet, No. 858, announcing Bulletin 9024, describing steam condensing plants consisting of Beyer barometric counter-current condensers, Ingersoll-Rand dry air pumps and Cameron water pumps; and Form No. 850, describing a useful accessory, a pocket oil flask designed particularly for use by drill-runners and similar workmen. The flask weighs only 3½ ounces and has a capacity of one-third of a pint.

War Relief Instead of Holiday Cards.

The Universal Portland Cement Co., 210 South La Salle street, Chicago, Ill., has sent out a letter urging a movement started in Chicago for saving the several hundred thousand dollars usually spent for Christmas and New Year cards and contributing the money to the Red Cross, Y. M. C. A., or other war work. The following letter is being sent out:

"At this time of world war when money is so sorely needed to alleviate suffering, reduce hunger and care for the sick and wounded, it seems sheer waste to spend money for such unnecessary and unproductive things as holiday greeting cards.

"A number of companies and individuals, among them the undersigned, whose custom it has been to distribute such cards, have decided not to do so this year, but instead to contribute the money to war relief organizations, where it will perform some real service.

"As lack of time prevents a personal canvass of other steel producers and consumers, as well as business houses and banks in general, this form of letter is substituted, and it is hoped the suggestions offered may meet with wide approval and be productive of generous results.

"Contributions should be sent direct (together with a copy of this circular, if desired) to The American Red Cross, the American Fund for French Wounded, or any other relief organization that may appeal to the giver."

The letter is signed by the following firms: Illinois Steel Co., Morden Frog & Crossing Co., American Steel & Wire Co., Universal Portland Cement Co., Lackawanna Steel Co., Carnegie Steel Co., Inland Steel Co., Chicago Railway Equipment Co., A. M. Castle & Co., the P. & M. Co., A. J. O'Leary & Son Co.

Haulage Costs Cut for Western Road Builders.

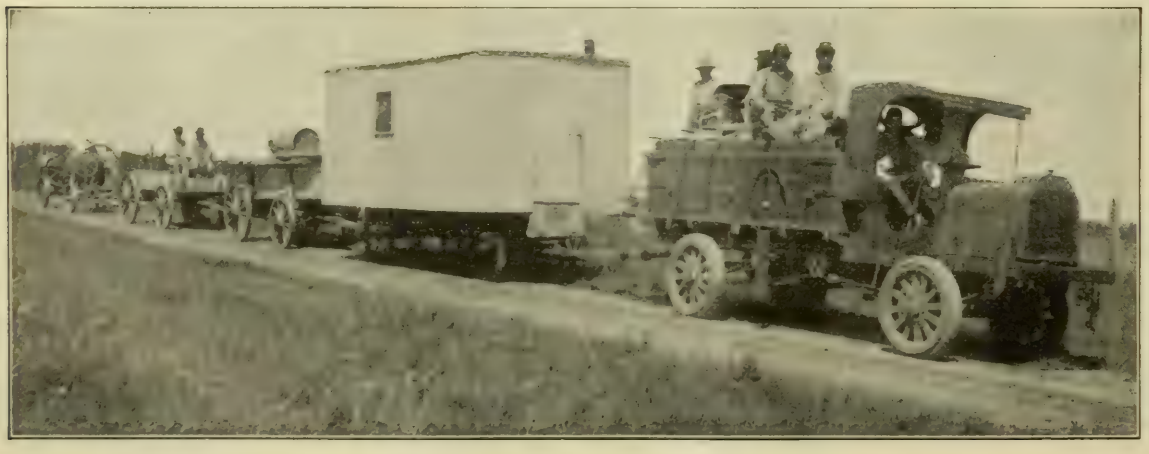
The accompanying illustration shows a Duplex truck, made by the **Duplex Truck Co.,** Lansing, Mich., in the service of the road commissioners of Black Hawk County, Ia. The commissioners estimate that the replacing of horse and mule teams with this 3½-ton, 4-wheel drive Duplex has cut down their haulage costs by almost a half. The Duplex is used for hauling gravel, bridge material and supplies for road building work. The photograph shows the Duplex hauling a load of gravel and tools, weighing 3,500 pounds, as well as pulling a bunkhouse weighing 5,500 pounds, tank wagon weighing 1,500 pounds, wagon weighing 1,500 pounds, cement mixer weighing 1,500 pounds, and eight men on the truck and wagon weighing 1,200 pounds. The total weight of the vehicles and loads was 14,700 pounds.

NEWS OF THE SOCIETIES

(*Continued from page* 501.)

as traction cars, etc. The spacing should be about seventy-five feet.

Harold A. Caparn, of New York city, pleaded for better designing in the building of residences. Neighbors and the pedestrian, he declared, are interested in the next door house, because the owner usually sees its exterior only twice daily for a brief interval while entering or leaving, while others are compelled to view it for many hours each day. The owner, he continued, usually regulates his face and appearance with a view of pleasing those with whom he may come in con-



DUPLEX TRUCK USED ON BLACK HAWK COUNTY, IA., ROAD WORK.

tact, but seldom thinks of his house with the same degree of consideration.

Tastes, Mr. Caparn declared, are molded by the things around a person. Mental development and happiness are affected by environment. Designs for all buildings, he concluded, should be submitted to an art jury.

By far the outstanding feature of the session was an address delivered at the last day by J. Horace McFarland, of Harrisburg, Pa., before some 300 members of the St. Louis Chamber of Commerce, who were hosts to the visiting delegates. He estimated the competitive opportunities existing there for recreation, which competition included the parks, playgrounds, churches and theaters as uplifting influences, opposed by saloons and dance halls as "down pulling" influences, and compared the total of these opportunities with the total demand for recreation. The figures he quoted definitely showed that the opportunities are woefully inadequate. He then logically traced the final result of bad recreational influences with their community expense, and convinced his audience that it would be better to invest in parks, playgrounds, summer and winter theaters, summer and winter baths, etc., than in jails, hospitals, correction farms, asylums, etc.

Mrs. T. P. Marshall, representing the Dallas Chamber of Commerce and Manufacturers' Association and the Texas Agricultural and Mechanical College, spoke of rural problems. She explained many of the causes which heretofore have induced boys and girls to leave the farms, and told of the community spirit that has developed in spots in the rural sections of Dallas county. So entertainingly did she expound her subject that by request of the audience she digressed upon other matters, and at the conclusion of her talk Secretary Watrous said that at some of the future conventions he hoped it would be possible to devote two or three days to country planning topics.

DeWitt McMurray, of Dallas, in a short impromptu address, also discussed rural problems, declaring that many of these are being solved through the educational work of the Agricultural and Mechanical College, the College of Industrial Arts and the country agents.

J. E. Surratt, of Sherman, paid a tribute to the progressive farmers of Texas, declaring that through their community and county fairs, the Texas Farmers' Congress and the various farmers' institutes they are broadening their horizon.

The afternoon session was devoted to discussing miscellaneous city problems. L. L. Leonard, of St. Louis, explained the ordinances in effect there to regulate billboards, which not only have been approved by the state and United States supreme courts, but the former even has formally declared that it is within the province of the city entirely to abolish billboards.

The solution of the smoke problem in Pittsburg was outlined by J. W. Henessey, chief of the bureau of smoke regulation of that city. He showed that the lack of securing thorough combustion of fuels is costing the United States at least $1,000,000,000 annually, which can be remedied at small expense.

Dr. Henry Gerling, assistant superintendent of public instruction of St. Louis, in an address declared that progressive educators are converts to the benefit of teaching civics in schools in order that their pupils may become well-rounded citizens.

American Public Health Association.

Hundreds of physicians and experts in public health matters were in attendance for the forty-fifth annual meeting of the American Public Health Association, which opened in Washington, Oct. 18 for discussion of medical topics, many of which relate to the war.

Herbert C. Hoover, United States Food Administrator, in an address before the memorial session, explained the problems confronting the nation from the food standpoint and asked co-operation of the doctors in making the campaign of economy successful. At no stage, the administrator said, did the Government want the health of the people jeopardized by lack of nutritious foods, and that was one of the reasons why the supply for domestic and army uses was to be looked after before filling the wants of the other nations.

Dr. W. A. Evans, of Chicago, president of the association, delivered an address at the evening session. Other addresses were by Gen. W. C. Gorgas, Surgeon General of the Army; Surgeon General Braisted, of the navy; Dr. Franklin H. Martin, chief of the medical commission, Council of National Defense, and Dr. W. H. Frost, director of the Red Cross bureau of sanitary service.

A greater need for efficient rural health administration was shown by statistics gathered from various sections of the country, read before the public health administration section, with recommendations that more intensive work for betterments be carried on. Administration under the state health district plan, also under the co-operative and local health plans, were discussed.

Allied with this work are the health problems of the war, and chief of them is that of venereal diseases, which is causing the army so much concern. The program adopted by the army and navy administrations for protection of men in cantonments originally to give the fighting forces a healthful chance, and secondary as a means of protecting the civilian population of the communities tributary to the cantonments.

Figures presented show the smallest percentage of this character of disease is with those of the Regular Army, and with the National Army it is the greatest. The National Guard infections are slightly below that of the new army. Education along the proper lines in the opinion of Regular Army surgeons would do more to keep the army free from infection than all of the regulations or punishment.

A report on the army in Europe shows it to be in satisfactory condition as far as venereal troubles obtain, since practically all of the present infection was carried from these shores. More stringent regulations surrounding the points of embarkation were urged. No army in the world, it was related, has the high standard of moral protection that surrounds the army of America.

Greater need for a general system of sanitary supervision of the industries in times of war was urged by Dr. E. R. Hayhurst, of Columbus, Ohio, as a means of insuring a high standard of public health. While the army is absent, it is the more necessary that those behind the lines keep in health and produce commodities under healthful surroundings Dr. Hayhurst pointed out that the Government could not afford to relax its vigilance behind the fighting lines owing to the theory of war being that the fighting lines must be kept supplied with healthful men. With this subject was discussed general measures for the prevention and control of industrial diseases in war industries, virtually including all lines of manufacturing for army uses, and the plan for co-operation of Federal and State authorities in bringing industries under sanitary conditions.

Community sanitation also was an important factor, but rests almost with the local authorities.

One of the interesting addresses of the convention was that of Colonel T. H. Goodwin, an eminent surgeon of the English army, on duty in this country, which dealt with the prevention of disease spread, and the preservation of health of the soldier on the western front, also an address by Major Pearce Bailey, of the United States Army, on mental diseases growing out of the war.

Addressing the association, Edward D. Rich, state sanitary engineer of Michigan, urged state supervision of garbage disposal as follows:

"Several of the states now have laws giving the state board of health supervision over sewerage systems and sewage disposal plants, which have been productive of much good in the elimination of nuisances and in protecting the public health by preventing the wholesale pollution of streams with untreated sewage.

"It would seem that a similar supervision over the collection and disproposal of municipal refuse would result in valuable assistance to the locality in enabling it to solve its problems economically and in harmony with the best practice.

"For the collection of reliable infor-

mation it is necessary that regular reports be required from all municipalities, that such reports be made in standard form as prescribed by the state board of health, that they describe fully the methods used and that they contain accurate cost data.

"In order to see that sanitary principles may not be violated in carrying on the work the law should require that the methods to be adopted and the specific plans of procedure must receive the approval of the state board of health before the work is begun. The statute should also give the board power to order such changes in equipment, or methods as may be necessary to prevent nuisances or protect the public health or even to require the installatio of an entire system if the local circumstances are such as to demonstrate its need.

In July, 1914, return postal cards were sent out to 210 municipalities in the state gathering the following information: Collection paid for by municipal tax, 32; garbage collected by private persons and the collector paid directly by patron, 21; collection covering entire city, 30; collection covering only part of city, 22; feeding swine, 9; feeding part to swine and burying remainder, 2; feeding part to swine and dumping remainder, 3; dumping on land, 12; burning on dump, 11; burial (including plowing it into the soil for fertilizer), 18.

"Fifty-one municipalities report frequently of collection as follows: Daily, 2; twice a week, 7; two or three times a week, 20; once a week, 11; every two weeks, 1; daily in business section, less frequently in residence, 4; once a week in residence, more often in business district, 2; once a week in winter, twice in summer, 3; once a week in business section, every two weeks in residence, 1.

Eight of the cities having municipal collection subsequently reported the percentage of population taking the service. The average of these eight is 60 per cent. Four cities having private collection reported an average of 28 per cent of the population taking the service.

"The above figures bear out a previous observation that it is a fact that only a very small portion of the families have their garbage removed when they are compelled to pay the collector directly, and that the collection of garbage is much more general when its cost is spread upon the tax roll."

Assistant Surgeon General John W. Trask of the United States public health service, told the convention that the work of the public health service in relation to the war was divided into three groups, protection of the health of the soldiers in this country, prevention of diseases being brought in by returning troop ships, and aid to the navy through quarantine stations and hospitals.

Health of the soldiers, Dr. Trask said, is protected by securing the best possible sanitary conditions and health administration in the territory surrounding the national army cantonments and national guard camps.

Facilities at the quarantine stations, particularly those on the Atlantic seaboard, are being increased to meet any emergency that may arise in connection with communicable diseases found on returning transports.

Illinois League of Municipalities.

The annual convention of the Illinois municipal league will be held at Urbana and Champaign Thursday and Friday, Dec. 6 and 7. The league, which is a continuation of the former mayor's association, has representatives on its membership of the larger cities, including Chicago, and small cities, towns and villages of Illinois.

The question of home rule is expected to be one of the principal topics to come before the convention.

Southern Appalachian Good Roads Association.

Asheville was selected for the 1918 meeting place of the Southern Appalachian good roads association at the annual meeting held at Nashville, Tenn., Oct. 18.

D. M. Clark of Greenville, N. C., was elected vice-president for North Carolina, and the following North Carolinians were elected as members of the executive committee: Dr. M. H. Fletcher of Asheville; W. S. Fallis, of Raleigh; and H. B. Varner of Lexington. The association went on record as favoring state and federal direction of trunk roads.

Connecticut Mayors' Association.

The annual meeting of the Connecticut mayors' association was held in Meriden Oct. 25, and these officers were elected:

President, Ernest Rogers, New London; vice-president, Dr. Joseph A. Cooke, Meriden; secretary-treasurer, Dr. J. M. Coburn, Norwalk; executive committee, George A. Quigley, New Britain; James Cray, Bristol, and Harold M. Meech, Middletown.

A dinner was held and the principal speaker was compensation commissioner George B. Chandler of Rocky Hill. The visitors enjoyed a theater party in the afternoon. A demonstration was later given of the city's new motor street sweeper and a new motor ambulance.

New Jersey Utilities Association.

The New Jersey Utilities Association held its third annual convention at the St. Charles Hotel, Atlantic City, on Oct. 26 and 27. Among the papers on the program were:

"The Proper Relations Between Public Utilities and Public Utility Commissions," Ralph E. Donges, president Board of Public Utility Commissioners of New Jersey; "The Problem of Higher Operating Costs and Commission Control of Rates," Thos. Conway, Jr., professor of finance, University of Pennsylvania; "Public Utilities Doing Their Bit," John L. O'Toole, Public Service Corporation, Newark; "Interrelation of Various Obligations for Adequate Utility Facilities Under War Conditions," George W. Fuller, consulting engineer, New York; "The Financing of Public Utilities," T. H. Dudley Perkins of Bioren & Company, bankers, Philadelphia; "The Binding Force of Term Contracts with Special Relation to Public Utility Rates," Ralph J. Baker, Harrisburg, Pa.; "The Valuation of Intangibles for Rate-Making Purposes," Dr. F. Herbert Snow, chief engineer Public Service Commission of Pennsylvania; "Utility Troubles—Their Causes, Effects and Remedies," W. H. Roth, Philadelphia.

T. H. Dudley Perkins in his paper made the following suggestions on the subject of the financing of maturing obligations:

"In every community the Liberty Loan is given the right-of-way, and every patriotic banker devotes his time to promoting the public good by helping to place these bonds among his clients. The periods of rest between the placing of these loans are fully covered by such necessary financing as renewals of maturing obligations, thus eliminating the possibility of any new financing at this time. Indeed, the question of renewal of maturing obligations is in itself a most serious problem, and with each new piece of financing being done on a higher interest basis than the last it becomes a serious question whether the Government should not consider the advisability of extending the maturing obligations which have been made for a period of more than one year and the maturity of which is not provided by such installment payments as car trust rentals, etc., so that at least during the period of the war our public service corporations should not be embarrassed by this expensive and difficult operation."

MUNICIPAL INDEX

(*Continued from page 499*)

Miami River Improvement Contracts. Details of the itemized bids called for on 12 large contracts. Alternative and provisional bids arranged for. 2,700 words. Municipal Journal. Oct. 25. 10 cts.

Predict Labor Demand Before Job is Started. New use of progress charts make it possible to tell where and why actual work varies from estimate. By Dan Patch. 5 ills. 2,000 words. Engineering News-Record. Oct. 11. 15 cts.

Trackless Trolley at Bradford, England. 600 words. Municipal Journal, Oct. 18. 10 cts.

Suggestions on the Care of Street Department Horses. Advice in pamphlet issued by Street Cleaning Department of New York City. 2,600 words. Engineering & Contracting. Oct. 3. 10 cts.

Comparative Cost of Operating Automobiles and Teams on Irrigation Project. 1,750 words. Engineering & Contracting. Oct. 10. 10 cts.

Some Data on Depreciation in Value of Horses. Abstract from a bulletin issued recently by United States Department of Agriculture. 1,600 words. Engineering & Contracting. Oct. 17. 10 cts.

Lump Sum Versus Percentage Contracts. Discussion by Chas. Keefe, J. P. H. Perry and R. B. Melvin. 1,800 words. Concrete. Oct. 20 cts.

Denver's New Storage Yard Served by a Single 100-Ft. Derrick. Location of storage yard of street railway company reduces haulage and handling costs. Only three men required to handle work. By Edward A. West, Chief Engineer. 8 ills. 2,000 words. Electric Railway Journal. Oct. 27. 10 cts.

Municipal Journal

Volume XLIII. NEW YORK, NOVEMBER 22, 1917 No. 21

CONCRETE HIGHWAY CONSTRUCTION IN ILLINOIS

Equipment Employed by Contractor in Vermilion County—Graders, Scrapers, Industrial Railway, Unloaders, Concrete Mixers, etc.—No Shoveling of Aggregates from Railway Cars to Mixer—Records Kept by Engineers.

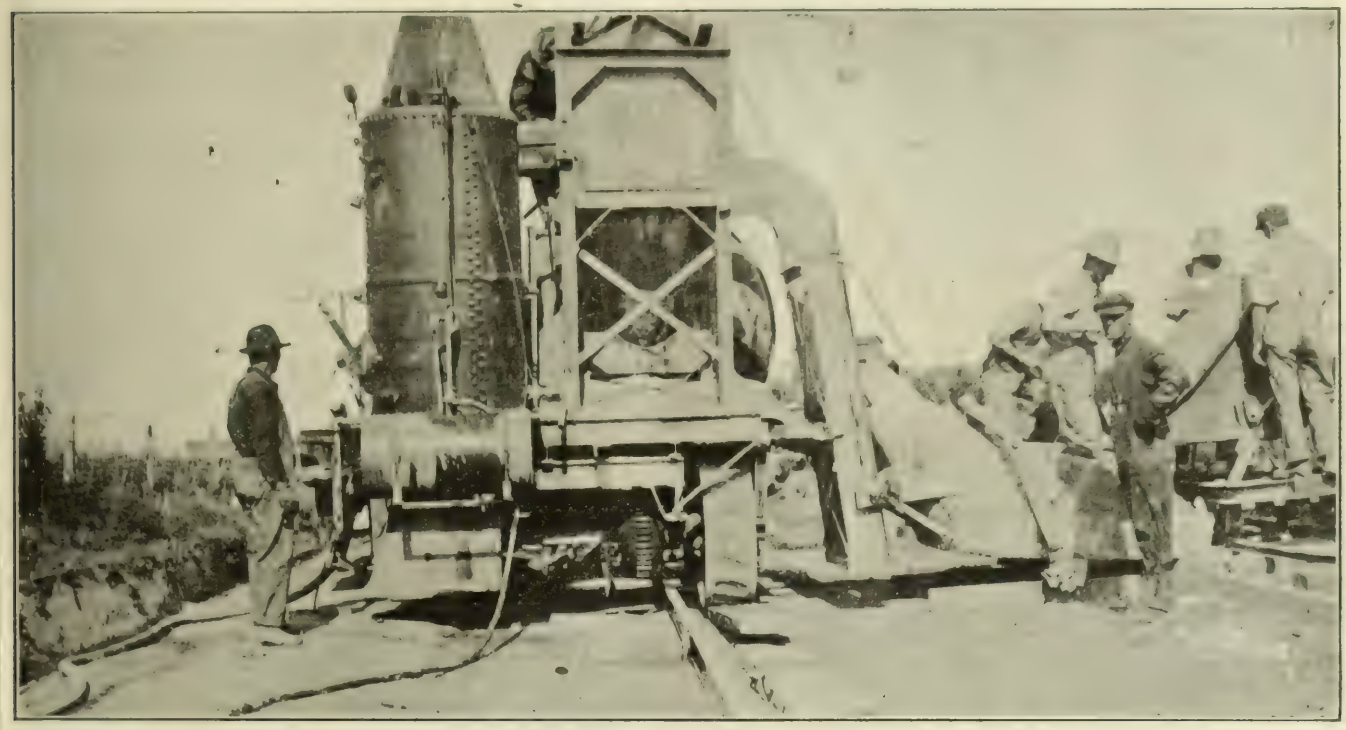


FIG. 1—INDUSTRIAL CAR DUMPING INTO SIDE LOADING SKIP.
Proper amount of gravel, sand and cement for one batch is dumped at one operation. Austin 33-cu. ft. cube mixer, with one wheel inside the form for the concrete pavement and one on the shoulder.

The contractors who bid on the construction of the concrete and monolithic brick highways in Vermilion County, Illinois, under the $3,000,000 bond issue in that county, knew that the competition would be keen and the successful bidders evidently proposed to use machinery wherever it could be used to advantage. The range in bids was very considerable and the low bid was usually about two-thirds the highest, although it had several competitors within 10 per cent in most contracts. This was the case in Section 8, where P. M. Johnston & Co., St. Elmo, Ill., bid $113,200, and had three competitors within $12,000 of their price, while the highest bid was $173,530.22.

This contract was for 19.809 miles of concrete road 10 feet wide. The unit prices bid, stating only those under which there was an appreciable amount to do, are given on the next page, the first column giving the prices of the successful bidder, and the highest seven bidders being omitted.

The average cost of the road per mile is $5,715 of which $3,580 is the cost of the concrete roadway and $2,135 is the cost of grading, drainage, shoulders, etc.

At the time of letting the contracts (March 16, 1916) prices were not so high for materials as they are at present, but possibly the contractor has been obliged to stand some increase even though his orders were placed before the increase of the last year or two. He certainly has been obliged to increase wages and has found men difficult to get, so that he would have been obliged to resort to machinery, even though it did not reduce the cost of the work; saving in men, these days, being quite as necessary as saving in cost.

Mr. Johnston includes in his equipment a Western elevating grader, Adams and Smith graders, numerous 1 cu. yd. Western wheel scrapers and ½-cu. yd. Western slip scrapers, several Fresno and Mormon wheeled scrapers, Kelly-Springfield 10-ton steam roller, Austin horse roller, Huber traction engine, Western dump wagons, an 8-ton and a Davenport 6-ton dinky, 1½-cu. yd. dump cars, steel tracks, Byers unloader with ½-cu. yd. clamshell bucket, three Austin cube concrete mixers of 33, 9 and 4 cu. ft. capacity, respectively, Heltzel and Blaw 6-in. steel forms, 4 and 6-h.p. gasoline engines, Myers and duplex pumps, 2-in. water pipe and canvas for covering green concrete.

Fig. 2 shows the Byers unloader at work, lifting gravel

FIG. 2—HANDLING AGGREGATE FROM RAILROAD CARS.
Byers unloader, with clamshell bucket, unloading into gravel and sand bins, from which the industrial cars (at the left) are filled by gravity, each car receiving the proper amount of each for a batch.

amount of cement is deposited from bags on top of the sand in the cars so that the exact amount of dry materials required for a batch is deposited in the mixer by one operation of dumping.

The mixer is self-propelling, running on the ground or on a board track according to the condition of the surface, with one track on the subgrade prepared for the concrete and the other on the shoulder of the road. It thus straddles one of the side forms, which can be laid some distance ahead of the machine, since the contractor has some 2,000 linear feet of the pressed steel forms, part of them of the Blaw design and part of the Heltzel.

Considerable time may be made or lost in the unloading of the cars into the loading skip of the mixer. The track should be at exactly the right distance from the loading skip so that the dumping of the car will be directly into the skip and no material will be lost in the operation, to be wasted or shoveled into the skip. Fig. 3 shows the result of too great distance between car and skip. One advantage of this dumping directly into the skip is that the materials reach the mixer perfectly clean, and if the slop-over must be shoveled in there is sure to be some dirt from the shoulder mixed with it. One of the men with a bar can force the track over ahead of the dump cars so that when the mixer moves up the track will be in proper location. As the mixer is supposed to move parallel to the side forms, he can be sure he is right by measuring with bar or shovel handle the distance from the side form.

A similar chance for mixing dirt with the concrete or

Details of the Nine Lowest Bids.									
Concrete pavement, cents per sq. yd.	61	60	64	60	63	70	65	60	60
Macadam shoulders, cents per sq. yd.	35	40	40	50	40	33	45	40	
Gravel shoulders, cents per sq. yd.	26	25	35	35	29	28	40	30	25
Earth shoulders, cents per sq. yd.	1½	3	4	2	3½	2	2	5	7
Excavation, cents per cu. yd.	28	23	25	35	30	28	30	28	40
Plain concrete, dollars per cu. yd.	5½	7	4½	5	7	6	7½	4	9.2
Catch basin, dollars each	7⅛	12	20	20	15	12	20	8⅞	12½
6" vit. pipe, cents per lin. ft.	23	15	7	25	17	25	30	20	25
8" vit. pipe, cents per lin. ft.	26	20	9	30	22	30	40	25	40
6" field tile, cents per lin. ft.	22	5	6	25	12	15	20	18	20
8" field tile, cents per lin. ft.	24	7	8	30	36	17	30	23	25

from the cars on the right and dumping it into the bins on the left, from which it is dumped into the industrial cars, a string of which is seen on the left. The clean work of the clamshell bucket in unloading is indicated by the appearance of the bit of car floor showing in the right foreground. Two men are employed on the unloader, one at the engine and one in the car. The railroad cars are moved by means of a rope and a spool on the hoisting engine of the unloader. Trains of the small dump cars can be moved in the same way, single cars being handled by the two men in charge of filling them from the bins. Sand is unloaded from cars into one bin in the same way as gravel, the farther bin in the photograph being for sand.

In loading the industrial cars a car is brought under the gravel bin and filled with a definite amount of gravel. It is then pushed to the sand bin and the proper amount of sand is dumped on top of the gravel.

The four men take the place of a small army which would be required to shovel the material from large to small cars, and the proper proportioning of sand and gravel would be very difficult if they were moved by hand.

When a train load of sand and gravel is ready a dinky hauls it to the work. The ordinary train for a dinky is 40 cars, which can be increased to 60 on ground nearly level.

The large Austin cube mixer is generally used on this contract. Its loading skip is on the side, so that the industrial cars can be dumped directly into it. Fig. 1 shows the loading skip receiving a carload of material. On its way to the mixer the train of cars is stopped at the nearest roadside storage of cement and the proper

FIG. 3—SPILLING OF DUMPED MATERIAL FROM SKIP.
Caused by too great distance of track from mixer.

for wasting material occurs if the cars are wider than the skip or there is carelessness in placing the car in front of the skip. There is no excuse for either of these occurrences in a thoroughly well-regulated gang.

At the time of the writer's observation of the work a fine drizzling rain had wet materials, car, and ground, but not enough to stop work. The dump cars did not dump cleanly and two men had to use shovels to empty them of a considerable portion of their load. The photographs, taken when materials were dry, show the same difficulty. This may be necessary because the track is not high enough above the skip and the pile in the skip formed by the first part of the dump prevents the running out of the rest of the material. If this is so, setting the car frames on platforms carried on the trucks would save the time of two men, for three or four inches additional height would probably be sufficient. If the trouble comes from insufficient tipping of the car body, a redesign of the tipping mechanism may be necessary, with some provision for preventing the tipping of the car truck and for recovering the car body, tipped beyond a convenient relation of center of gravity and center of suspension. The desirability of such change is seen most clearly in Fig. 4.

The single cars about the mixer can be handled by the men engaged in the dumping. The train of full cars can be handled by the dinky or by a mule, and the train of empty cars can be hauled to the nearest switch by the mule, there to be picked up by the dinky when it brings a train of full cars. With reasonably short distance of mixer from unloading track, the trains can be handled by one dinky and a mule, instead of two dinkies, thus replacing two men by a boy and one locomotive by a mule.

One danger with this method of operation is that a breakdown of either mixer or track or train shuts down the whole job until the repair is made or the train is put back on the track, and there will be several idle men during the breakdown. Whereas, if the materials are dumped along the grade and thence shoveled or otherwise loaded into the skip, the transportation service can go on while the mixer is being repaired, or the mixer will have a supply of materials on which to work while the transportation system is being put back into commission. The difficulty mentioned may be more imaginary than real, for, while time may be saved, the larger number of men required to handle the materials with shovels and wheelbarrows from piles to skip may eat up more wages than would be lost by the double chance of idle time with the smaller number of men now used. Proportions of materials would be more irregular also.

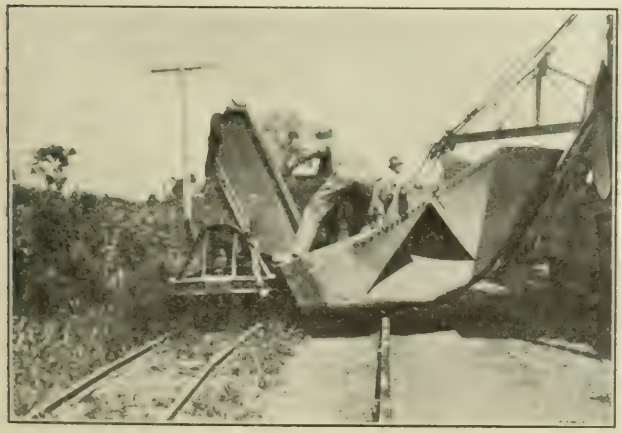


FIG. 4—SHOVELING FROM CAR TO SKIP.
This and Fig. 3 show that some shoveling is necessary in emptying cars because bodies either are not high enough or do not tip far enough, or both. This skip seems to be preferable to that shown in Figs. 1 and 3.

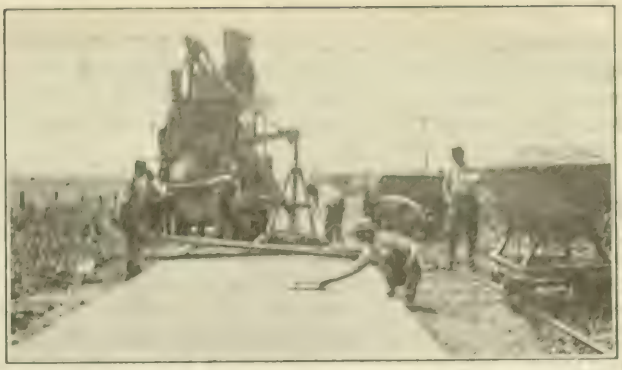


FIG. 5—PLACING CONCRETE AND FINISHING SURFACE.
This method has been superseded by the roller method

Probably the superiority of one method over the other depends more on the special experience and qualifications of the contractor than on the theory of the case.

The number of men observed at work after leaving the unloading bins was two men on the moving train of cars, full or empty; boy and mule handling empty cars; 1 man putting cement on cars of sand and gravel; 4 men placing and dumping cars into loading skip; 2 men on mixer; 3 men spreading concrete; 2 men on shaper, finishing roller and forms; and 1 foreman.

Fig. 5 shows the mixer depositing concrete, also hand smoothing and finishing. Some improvement in speed and in smoothness of finish, at least, have been made. A heavy stroke board is now used, running on the side forms and pulled by a chain from the mixer as it moves forward on its caterpillar tractor. This saves considerable labor and time and each section is stroked off in this way as the machine moves up ready for the next section. Any deficiencies in the surface are made up by the men in charge of the surface, as they saw a shaper back and forth across the surface left behind the stroke board. The final finish is made with the Macon concrete paving roller originated by Capt. J. J. Gaillard, city engineer of Macon, Ga., and made by the Ransome Concrete Machinery Co.

The expansion joints are pre-molded, ½ inch thick, and at the time of observation were located 100 feet apart. The specifications provide that when the temperature is less than 70 deg. F., they shall be so located, and that when the temperature exceeds 70 they shall be located 200 feet apart. A steel plate is put in place to fix the end of a block, the felt expansion strip being placed against it. After the construction of the following section has been started, the steel plate is removed, leaving the joint without armor plate protection.

The finished concrete is covered with canvas as soon as this can be done without marring the surface, the canvas being kept wet until the concrete has received sufficient set, when it is removed and the concrete is covered with 2 inches of earth, which is kept wet for two weeks. The earth is left on for 30 days or more according to weather conditions, when it is cleaned off and spread uniformly over the earth shoulders, taking care not to leave any of it on the macadam shoulders provided for next to the concrete. The roadway is then opened to traffic.

The gang described is able to lay 600 to 700 feet of road per day under good conditions.

Cement is furnished to the contractors by the county. Marquette, Chicago A. A., Universal, and Continental brands have been used, the original contract having been for the first two brands and the other two used later when labor troubles interfered with the steady delivery of the cement.

The specifications for this work have been very care-

fully worked out by P. C. McArdle, the superintending engineer, his associates, and the State Highway Department, and have some specially interesting provisions. Among those not in universal use and not mentioned above are the following:

The fine aggregate is sand of clean, hard quartzite grains or equally hard material with not more than 3 per cent of clay and loam combined nor more than 0.5 per cent of loam, defined as humus or organic matter. Shale, slate or decomposed limestone must not be present. The gradation of sizes prescribed calls for not less than 95 per cent through a ¼-in. screen, not less than 30 nor more than 75 per cent through a 1/16-in. screen, not more than 15 per cent through a 1/50-in. screen and not more than 5 per cent through a 1/100-in. screen.

The coarse aggregate is clean, hard, sound, flint or other silicious pebbles graded so that all will pass through a 1½-in. round mesh screen, not less than 40 nor more than 70 per cent through a ¾-in. round mesh and not more than 5 per cent through a ¼-in. round mesh. Slate, shale or disintegrated limestone must not be present. Crushed granite, trap or limestone may be used instead of gravel if the French coefficient of wear is at least 8 and the toughness at least 6. Natural mixtures of gravel and sand are not permitted. The sand and gravel must be separated and then recombined in the specified proportions.

To control the amount of the county's cement which is used, a sack of cement is considered as 0.95 cu. ft., and, all measures being by volume, a cubic yard of concrete, proportions 1:2:3½, is required to contain 1.61 barrels of cement. This is on the assumption that the mixture of aggregates contains 40 per cent voids. If this percentage differs greatly from 40 in any material accepted for use, the engineer may change the amount of cement to be used. Each day the division engineer computes the amount of cement required for the concrete actually laid and compares it with the count of sacks of cement actually used. The contractor agrees to remove and rebuild all sections in which the amount of cement used is 2 per cent less than the required amount. If he uses to exceed 2 per cent more than the required amount he is charged with the cost of the excess beyond 2 per cent.

In preparing the old roadbed for the concrete layer great care is taken to have the subgrade uniform in density. If the sides of the road are filled, the center must be loosened up until it is as loose as the fill, before the roller is put on, so that the whole width of the roadbed shall be uniformly compacted. This is required especially when the old roadway has a gravel or macadam surface and such surface does not cover the whole width of the new pavement.

The specifications provide for finishing the concrete surface by wooden floats, but the new Macon roller is considered to produce a denser concrete and a surface which is more uniform and has fewer depressions and high joints, so that its use is now permitted.

Shoulders are not constructed until 30 days after the concrete has been finished. The material for gravel or macadam shoulders is not hauled in until this time and the shoulders must be smooth and join up with the concrete surface after rolling with a 5-ton roller. After these special shoulders have been constructed they are continued with earth according to the cross-sections required by the plans and are also rolled with a 5-ton roller. A horse roller of large diameter is used. Care is taken not to injure the edge of the concrete pavement.

WORK REPORTS.

The engineer's office has a complete system of report blanks, including:

One for the daily amount of cement used, area of pavement laid with it and percentage of excess or deficiency of cement.

One showing, for each day, the exact location of pavement laid, pavement earth covered, canvas covered, watered morning and afternoon, opened to travel, culverts built, grading in progress, and quality of fine and coarse aggregates and of concrete. These reports are diagramed on progress charts in the office so that the stage of progress of each item from excavation complete to road accepted shows at a glance for each job under construction.

One weekly report showing the amount of labor cost each day for each of such items as superintendence, excavation, shaping and rolling, subgrade, hauling brick, sand, stone, cement, incidentals (each separate and distinct), hauling and placing tile and catch basins, building side forms, mixing and placing concrete (including handling joints), laying and rolling brick, grouting joints in brick, covering and seasoning and cleaning pavement, hauling and placing macadam or gravel shoulders, finishing earth shoulders, and water.

One weekly report giving date, car number, and barrels or cubic yards received and used of cement, sand, stone or gravel, and number of brick received and used each day.

One weekly report on culvert construction, giving location and 15 items of labor and 6 items of material cost.

A report of abrasion tests of brick, one of tensile tests of cement, one of sieve tests of stone or gravel and one of sand.

P. C. McArdle, superintending engineer, and Mr. Clark of his office, have very courteously supplied large amounts of information and photographs as aids in the preparation of this article.

HANDLING SLUDGE FROM ACTIVATED PLANTS

Conclusion from Operation of Test Plants at Chicago and Fort Worth—Settling, Coagulating and Filter Pressing—Possible Developments.

A few weeks ago we published an abstract of a report by Langdon Pearse and W. D. Richardson in which they recommended the adoption of the activated sludge process for handling packinghouse wastes. Later, in a paper before the American Public Health Ass'n, Mr. Pearse discussed more generally the use of this method of treating packinghouse wastes.

In this connection he stated that the handling of the sludge is probably the most knotty problem of all. In the Sanitary District of Chicago, the accumulation per million gallons of screened sewage, exclusive of the screenings, averaged during a period of nine months about 46,500 gallons of liquid sludge containing 99.2 per cent of water. This is equivalent to 2,420 lbs. of dry sludge per million gallons; the amount appearing to vary between 1,100 and 4,500 lbs. The screenings caught on a 30-mesh screen varied from 500 to 1,200 lbs. of dry material per million gallons of day flow.

In treating such sludge, the essential point is to remove the water. Various expedients have been tried, which may roughly be divided into (1) settling, (2) use of coagulants, including both alkali and acid, (3) filter pressing. Centrifuging has not yet been tried at Chicago.

With very liquid sludge, direct filter pressing is difficult owing to the large amount of liquid to be handled. Preliminary treatment by settling, with or without acidification, is very helpful, quiescent settling for from 3 to 6 hours reducing the moisture content to 98 or 98.5 per

cent. The addition of about 6 lbs. of sulphuric acid per 1,000 gallons of sludge containing 98 per cent moisture seems to aid in filter pressing and makes a sludge that leaves the cloth cleaner. A 2½-hour pressing with acid-treated sludge is equivalent to 3½ or 4 hour-pressing with settled sludge. Moreover acid-treated sludge apparently keeps better and shows a somewhat higher nitrogen content.

The effect of acid on activated sludge, however, is not at all the same in different places. On that obtained in the Sanitary District plant, the effect of the acid is a minimum, whereas on sludge from the Packinghouse sewage at Fort Worth the addition of acid produces a rapid coagulation with immediate flotation of the sludge, the moisture content being reduced quickly. The water used at Fort Worth was, however, very high in alkali. By draining and re-treating, the sludge can be further reduced to about 85 per cent moisture or lower at Fort Worth, but not at Chicago.

Plain settling has considerable value in reducing the moisture content, but the effectiveness varies with the condition of the sludge, being less marked with domestic sewage at Milwaukee than with packinghouse sewage at Fort Worth.

Further development in the activated sludge process appears to be possible along the lines of reducing amount of air used, improvement of settling tanks, and more rapid reduction of water content of the sludge. Developments along these lines would tend to reduce cost of both construction and operation. Reduction in the use of air may be effected by improvement in the designing of the tanks in order to promote mixing and distribution of the air, and possibly along the lines suggested in England of intermittent application of air.

The improvement of settling tanks is in a transition stage. Steep hopper-bottomed tanks are effective, but other devices may prove to be even more so, such as the Dorr tank, particularly where the retained sludge is re-aerated separately and re-settled before returning to the inlet.

Ways and means of reducing more rapidly the water content of the sludge should be studied, either in preparation for filter pressing or as a direct preliminary to drying. This is a complex problem verging on the domain of physical chemistry.

ASPHALT BLOCK PAVEMENTS ON SAND.

Asphalt block pavements have been laid on soil base in Savannah, Ga., with remarkably successful results. This success is due largely to the character of the soil upon which the block is placed, this being sand with a small amount of loam intermixed. On clay, there is some danger of failing, due to moisture getting under the block. Neither does pure sand yield good results, as there is a creeping movement and the blocks are not firmly held in place. Success of the method requires proper construction. The method followed in Savannah is as follows:

The street to be paved is graded to approximately the established sub-base, curbs and catch basins are installed, and the street thoroughly puddled and repeatedly rolled with a 10-ton roller. If any portion settles below the sub-grade base, material is added and compacted by puddling and rolling. Grade pegs are then set and the surface carefully shaped with templets, care being taken that no foreign material is left on the surface. The blocks are then carefully laid. One man follows the pavers, driving the blocks on the edge so as to have as tight joints as possible. The blocks are then rolled with a 10-ton roller and the joints filled with river sand, which is left scattered over the surface for ten days or two weeks before being cleaned off. Between street car tracks, the blocks are laid longitudinal, there being the proper space between the rails for an even number of rows. The blocks are placed under the head of the rail and the center arched, so that the more pressure on the section, the tighter it becomes. At intersections, the blocks are laid against the rails without crown.

The average cost per square yard for this pavement is:

Watchman	$ .010
Grading	.080
Rolling foundation	.010
Laying block	.112
Placing sand and filler	.002
Paving backs at intersections	.002
Cleaning up	.008
Shaping base	.010
Total labor cost	$ .234
Asphalt blocks	1.540
Sand	.005
Equipment	.030
Tools and coal	.001
Total cost	$1.810

IMPROVING MUNICIPAL REPORTS

Suggestions by Official of Columbus, Ohio—Prompt Completion—Condensation and Uniformity Rendering Reports More Serviceable to Taxpayers.

We have on two or three occasions during the past year published more or less extensive abstracts from the official reports of the departments and divisions of the city government of Columbus, O., and called attention to the valuable information conveyed thereby and the excellent manner in which it was presented. Not content with this, however, the Bureau of Information and Publicity of that city is endeavoring to improve upon the details of these reports. Recently the assistant in charge of the bureau, C. E. Dittmer, sent to the heads of all departments and divisions a communication which is printed herewith. The advice given can be read with profit by every official who has to prepare a report on the work of his department, and in fact by every one who has to prepare descriptions of any kind of municipal work. An observance of these suggestions would eliminate many of the objectionable features found in so many municipal reports and which detract from either the impresion given by them or the clarity of statement. For instance, the promiscuous use of the word "department" in referring to any division or sub-division of the governmental service is very confusing. Frequently we find a superintendent, in describing the work of a division or bureau under a department, referring to it as the work of his "department." Ordinarily it is plain from the context whether the entire department or only the bureau is referred to, but in some cases decision cannot be made with certainty.

One suggestion which if adopted would entirely change the material and length of a great many municipal reports is that recommending the absence of all tabular matter so far as possible. We have referred to this two or three times during the past year, calling attention to the fact that in some cases scores and even hundreds of pages are printed and distributed at great cost which contain nothing but tabulated figures that probably convey no information whatever to more than one-tenth of one per cent of the population, which individuals could have obtained this information by reference to the books of the department. As Mr. Dittmer says: "There

is no necessity of including in your report a financial statement for the year's business. The auditor's report will carry this."

He calls attention to the ordinance that requires all departmental and divisional reports to be filed with the city clerk on or before January 28th of the year immediately following that which they cover. This does not insure promptness in issuing the annual report, however, and the city official in charge of the actual printing thereof has an important duty to perform in securing prompt work by the printer in issuing the report after the manuscript is in his hands.

If a city the size of Columbus can have all of the annual reports from its departments finished and ready for publication before the end of January, we see no reason why the same promptness cannot be attained by any city in the country. And, as we have so often stated as our opinion, the value of the report to the citizens, and also to the officials and city government generally in securing the co-operation of the taxpayers, is enormously increased by promptness in getting it in their hands.

To Department or Division Heads:—

By provisions of Ordinance No. 29,760, passed December 11, 1916, annual reports for the preceding year must be filed in duplicate with the city clerk not later than the last Monday in January.

Columbus gained considerable recognition in municipal publications this year on the policy set down and followed out in handling annual reports. This city appears to be pioneering in this detail. With cooperation of all municipal agencies a work so admirably launched can successfully be carried on.

To assist in preparation of these reports, details that will operate for uniformity are herewith suggested. Of chief importance is condensation. Do not put anything in your report that has no bearing on the operation of your department. Each extra word means an unnecessary printing expenditure. Failure to follow this suggestion will necessitate editing your copy in this office before the report is sent to the printer.

There is a popular demand among Columbus taxpayers for "greater service for less money." If your department has to its credit accomplishments of this character, set down such facts in your report. Do not burden your 1917 report with information or details that were carried in your 1916 report. Include only information covering 1917 activities.

For your information, these suggestions are made:

(1) Use legal size paper only; that is, 8½ x 14 inches. All reports must be typewritten and double-spaced. Under no consideration should single-spacing be employed.

(2) Never make use of the first person pronoun in writing a report. Examples: (Incorrect) "I recommend that extensions be of the new type." Employ this style: "This department (or 'the superintendent') recommends that extensions be of the new type."

(3) Do not say: "This department," when the correct form is "this division." Follow the charter.

(4) In capitalization, avoid "upper case letters" except in referring to proper names. Do not use this form: "This Department proposes that the Market Houses be placed under supervision of the Street Cleaning Division." Rather, follow: "This department proposes that the market houses be placed under supervision of the street cleaning division." Above all, avoid long and involved sentences.

(5) Wherever reference is made to figures in a report, except in tabulations, use numerals for figures above ten, and write out, in full, figures below ten. Examples: (Incorrect) "During the year 9 horses consumed one hundred tons of hay." (Correct) "During the year nine horses consumed 100 tons of hay." Other exceptions to this rule: Reference to sums of money should be in figures; also dates.

(6) Eliminate tabular matter, so far as possible. As a general rule, the public cares nothing about a great volume of unintelligible figures. It is preferable that a narrative form, based on figures, be submitted. There is no necessity of including in your report a financial statement for the year's business. The auditor's report will carry this. There are cases, of course, where figures and tables are of more value than "straight matter." For example: The tables "Fire Losses" and "Insurance, 1916," in the 1916 report of the Columbus fire department, page 115 of the bound reports in your possession, could not be set forth in any other satisfactory form.

(7) In the bound volume of 1916 reports there are several splendid examples of form for guidance in preparation of your report for 1917. The form followed in the civil service report, page 162, should be followed as regards subdivisions. So far as practicable, follow such style in explaining the operations and accomplishments of your department. Other good examples are: Report of division of fire, page 114; report of division of police, page 118; report of division of garbage and refuse collection, 46.

(8) The rule set down in Ordinance No. 29,760, governing the date of filing reports must be followed rigidly. This means that all departmental and divisional reports must be filed with the city clerk on or before January 28, 1918.

This bureau stands ready to answer questions and assist in preparation of your report, when so requested.

Very truly yours,

C. E. DITTMER,

In Charge, Bureau of Information and Publicity.

THE NEW WAR TRUCK DESIGN.

The quartermaster's department of the army and members of the Society of Automotive Engineers have cooperated in designing a heavy-duty war truck, which is believed to be superior to anything yet put out by any manufacturer. The designing of the truck was completed a little more than a month after the problem was definitely placed before the designers and their force organized, and the first two trucks to be actually assembled and completed ready for service were turned out a few days ago at Lima, O., and Rochester, N. Y. Both are designed for a 3-ton load, with a capacity for 5 tons. Early tests of the engine showed 58 h.p. at 1,350 revolutions per minute, and the engine torque curve is even better than anticipated. The total weight of the chassis without body is 8,500 lbs., so that the complete truck will weigh about 10,000 lbs. The engine weighs about 1,000 lbs., although this weight may vary 40 or 50 lbs. as manufactured in the different plants. Orders for parts for 10,000 trucks have already been placed.

In designing this truck four major divisions were made—the engine, the transmission, the axles, and the other chassis parts. From three to five different companies were represented by their engineers in the designing of each unit and each is believed to represent a composite of the best features employed by the best truck manufacturers of the country and neither the whole truck nor any unit can be considered as the work of any one individual. It is believed that the design resulting from this co-operation will have considerable effect upon the future of truck manufacturing in this country.

SEWAGE DISPOSAL FOR INDIANAPOLIS.

A report on the application of modern methods of sewage treatment to the conditions in Indianapolis, Ind., made by G. W. Fuller to the sanitary commission of that city, considers in some detail the Imhoff tank, the activated sludge and the fine-screen methods of treatment, and decides in favor of the last. Mr. Fuller was chairman of a committee for making the report, the other two members being P. H. Norcross and J. R. McClintock.

The favored method, according to the report, includes fine screens, deep sprinkling filters, humus tanks and sludge drying. The cost of the plant is estimated at $3,090,050 and the cost of operation, after deducting the estimated receipts from the sale of the dried sludge for use as fertilizer, is $42,372.

This cost being in excess of the funds at present available, it is proposed to construct the sewer connecting the present system with the plant, the grit chambers, the pumping station, and the fine-screening plant of the full

capacity estimated for the year 1925, and to reduce the capacity of the rest of the plant about one-third, so as to bring the total cost down to $2,438,000, but to increase the cost of operation to $50,370 a year, since the return from sales of the less amount of sludge would be smaller while the cost of operation would be reduced but little.

It is not expected that this will completely remove the present very objectionable conditions in White river, but it will give a very substantial relief, and when more funds are available the additional units of the filtration, sedimentation and sludge treatment plants can be constructed until the condition of the effluent from the plant is brought to any desired degree of stability.

The report refers to the large installations of Imhoff tanks and their difficulties, and to the large experimental plants on the activated sludge system, but the recommended plan has not yet been installed on a commercial scale and as a whole in this country, if anywhere. It may be that the requirement (due to lack of funds) that but a portion of the filtration and sludge-treatment plants be installed at the beginning, is fortunate. The report is not encouraging as to the efficiency of the Imhoff-tank and activated-sludge systems and this leads the reader of it to feel the same doubts about the efficiency of the recommended system, which can be best removed by actual experience with a unit built of the most approved capacity. Additional units could then be constructed, with such modifications as experience with this full-sized trial unit are practically sure to suggest.

CONCRETE WATER TANK AND TOWER.

A reinforced concrete tank for the water supply system of New Trier, Minn., has recently been completed. The tank is 16 ft. in diameter and 24 ft. high, having a capacity of 37,000 gallons of water. It is supported on a tower 50 ft. high and 16 ft. in diameter. The bottom of the tank is of inverted cone shape. The walls are six inches thick. The concrete for the tank is mixed one part cement, 1½ sand and 2½ gravel; that for the tower is mixed 1:2½:5. The tank is surrounded with steel hoops of ¾-inch square steel spaced 5 inches between centers. It was built by the Circular Concrete Co., the contract price being $3,100.

INDIANA APPORTIONS HIGHWAY FUNDS.

The Indiana State Highways Commission has recently apportioned the state and federal funds which will be available for road building on the main market highways of the state, which highways had already been designated by the commission. This apportionment has been approved by the governor and work on these 778 miles of main market highways may be begun as soon as the counties through which the highways pass appropriate sums equal to the amounts apportioned by the commission.

Five highways have been designated, one running north and south through the center of the state, and four running east and west. The lengths in the several counties vary from a minimum of 5.7 miles in Floyd county, to a maximum of 55.6 miles in Jackson county. A total of $1,944,750 is apportioned for the 778 miles, or an average of $2,500 per mile.

LOW ELECTRIC RATES IN LOS ANGELES.

Recently Adopted by Municipal Power and Lighting Bureau—Power and Street Lighting Rates Reduced One-third—Trucking Poles.

By C. W. GEIGER.

The Public Service Commission of Los Angeles, Cal., has adopted a schedule of rates for power furnished by the municipal Power and Lighting Bureau that are as low as any in that section of the country. This is in fulfillment of pledges of the aqueduct power officials that when the city owned its distribution system and transmission lines, rates for industrial power would be made as low as those enjoyed by any city on the Pacific coast. In addition to being as low as the lowest, the new rates also eliminate the discrimination against industries in the city of Los Angeles and in favor of those outside the city which had been practiced by private power corporations. This latter feature is an exceedingly important one to the industrial life and development of the city, since it wipes out the handicap which had been imposed on industries in the city in favor of those outside.

The lowest rate for industrial power made by the private companies was 1.16c. per kwh. The rates now offered by the municipal plant run as low as 0.73c. for one million or more kwh. in any one month, and increase by increments of 0.02c. to 0.15c. to a maximum of 1.56c. for 6,000 kwh. consumed in one month.

Street lighting rates were greatly reduced also. The corporation furnishing the street lighting had charged $75 a year for arc lamps of about 400 c.p., while the municipal bureau charges the city $50 a year for 600 c.p. incandescent lights and $60 for 1,000 c.p. incandescent lights. As fast as the contracts of the corporation with the city for street lighting run out they are being taken over by the municipal bureau. In introducing the new lighting system, the lamps were placed 75 yds. apart instead of at the corner of each block, as formerly. The municipal department worked day and night installing the new fixtures in order to be ready to light the city when the lighting contract had expired, and the last light

TRUCK USED FOR DELIVERING 80-FOOT POLES IN LOS ANGELES.

was up and ready for use just ten minutes before the company turned off its current. Another improvement was in the system of applying the current so that the burning out of one light would not extinguish all of those on the circuit, as had previously been the case. Part of the city is lighted by contract with the Edison Co., and under a temporary operating agreement with this company the city can not extend its lines into that company's territory. The earnings of the municipal plant are now averaging $2,000 a day and will be double that by the end of two years.

Transmission lines of 30,000 h.p. practically encircle the entire city and extend down to the sub-station at the harbor, where power can be furnished to the shipyards and other industries. For supporting the cables of this transmission line, the municipal department used poles some of which were 80 ft. in length. For transporting these poles it used three trucks carrying from 13,000 to 18,000 lbs. of poles each. These trucks were specially equipped by the city so that they could turn in an 80-ft. street with a load of poles 80 ft. long. Each truck is equipped with a drum on the rear wheels which was used by the crew for loading and unloading the poles. The rear axle is jacked up and the power of the motor that operates the wheel and connected drum pulls the poles onto the turning bolster in a few minutes. This drum can also be used for drawing the cables over the cross-arms, and a short time ago one of the trucks pulled in 5,000 ft. of ¾-in. copper cable in 45 minutes, which is about one-fourth of the time that would have been required by mule-hauling.

HEATING WATER ELECTRICALLY.

Practice of Cities in the Northwest—Kind of Heaters, Insulating, Wiring, Cost—Difficulties Experienced and Remedies Applied.

One of the drawbacks to the electric range is the matter of heating water electrically at a cost low enough to give satisfactory service. Considerable attention is being paid to this phase of electric cooking on the Pacific Coast, and a rather comprehensive report was made by the subcommittee on electric water heating at a recent annual convention of the Northwest Electric Light & Power Association.

Replies received to a questionnaire from thirteen companies operating in Washington, Oregon and Idaho were as follows:

1—Are you heating water electrically? Answer—Four, no; nine, yes.

2—What is your rate? Answer—One, a meter rate of 3 cents less 10 per cent, and eight flat rates ranging from $3 to $6 per kilowatt per month.

3—What size and types of heaters are you using? Answer—Nine, non-automatic circulation, varying from 1 kw. to 5 kw.; six, non-automatic immersion, varying from 0.5 kw. to 2 kw.; one, automatic immersion, varying from 1.5 kw. to 3 kw.; one, plaster type, no capacity given. The non-automatic circulation type of small capacity seems to have been used the most extensively and the non-automatic immersion next. The consensus of opinion seems to be that, since the heaters are operating on a flat rate, the small capacity non-automatic circulation type is the most popular under these conditions.

4—How many installations have you and what is the connected load? Answer—Stations reported a total of 1,930 heaters in use with a connected load of 3,560 kw.

5—Are your consumers satisfied? Answer—Five, yes; two, mostly yes, in some cases no; one, have been unable to meet all demands with 1,500 watts; one, very little complaint.

6—Are you connecting water heaters on double-throw switches with ranges to prevent both operating at one time? Answer—Five, yes; four, no.

7—Are you insulating boilers, and how? Answer—Five, yes, with J-M felt and Keystone; one, yes, with good covering top with wool; two, in some cases; one, no.

8—In your opinion will electric water heating increase the popularity of electric cooking? Answer—Eight, yes; one, no.

9—Do you do wiring for water heaters yourself or sublet it to wiring contractors? Answer—Five, place some with contractors and do some themselves; three, let all to contractors; one, does all.

10—If sublet to contractors, please outline your arrangement with them for doing the work. Answer—One, pay them cash for installation; two, get bids, awarding to lowest bidder; two, all work done time and materials; one, get material at cost and allow regular time; one, get bids, submit them to consumer, if accepted company pays bill and extends credit to consumer.

11—Does the price at which you sell water heaters include wiring and installation? Answer—two, no; seven, yes.

12—What is the average cost of plumbing connections to average household boiler? Answer—Cost varies from $2 to $7.50.

13—What percentage of your water-heater consumers continues the service for twelve months of the year? Answer—One reported 100 per cent; one, 90 per cent; one, 60 per cent; three, 50 per cent; one, none; one, not yet determined.

14—What additional annual revenue do you secure from ranges equipped with water heaters? Answer—One from $24 to $72; one, $42 per kilowatt; one, $36 per kilowatt; one, $20; two cannot determine.

15—What success have you had in heating water for public baths, barber shops, and other commercial installations? Answer—Two report no installations; three, small barber shops very successful; two, barber shops, fire engines and small hotels all very satisfactory.

16—What is the most frequent complaint from consumers in regard to type of water heater you install? Answer—One reports that induction heater hums and all too slow to bring water up to desired temperature when much hot water has been drawn off; one, trouble with heaters filling up with lime; two, breakdowns and leaks; two, no troubles; one, circulation type, no circulation, "plaster" heater too slow; two, not sufficient hot water.

17—What steps are you taking to remedy these troubles? Answer—One is insulating boilers and increasing size of heaters; one is making more careful investigation of consumers' requirements; one is restricting circulation to raise temperature; one is making repairs to get heater back in service as soon as possible.

18—Do you replace burned-out heater elements free of charge? Answer—(a) During manufacturer's guarantee period, seven, yes; one, no. (b) After the guarantee has expired, one, yes; six, no; one, no burnouts; one, undecided.

19—Has your company had experience from electric water heaters going to ground during lightning storms? Answer—Two, yes; seven, no.

20—Have you installed lightning protection ahead of your heaters? Answer—All, no.

21—Have you had trouble with heaters clogging up with scale, and what remedy have you applied? Answer—Four, no trouble; one, has not solved the problem yet; two, remove and clean heaters.

22—With regard to the immersion heaters, has the scale on any of them become so heavy that the heaters could not be removed from the boiler? Answer—Six, no; one, yes.

ADVERTISEMENTS REGULATED IN PANAMA.

The city council of Panama has issued a decree that in future no signs or advertisements will be permitted in public places unless the owners sign a contract with the municipality for their display. Commercial signs in front of places of business are excepted from this decree. They pay $1 a month, or if paid in advance, $10 yearly.

All signs displayed in public places must be stamped, showing compliance with the provisions of this decree, and must be in Spanish, although a foreign language may be placed immediately under the official language of the country.

The display of signs, advertisements, or posters containing mistakes is prohibited. Violations of this decree are punishable with a fine of $10 for the first offense, and $20 in case there is a repetition.

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Contributions suitable for this paper, either in the form of special articles or as letters discussing municipal matters, are invited and paid for.

City officials and civic organizations are particularly requested to send Municipal Journal regularly their annual and special reports.

Information Bureau.

Municipal Journal's Information Bureau, developed by twenty-one years' research and practical experience in its special field, is at the command of our subscribers at all times and without charge.

THE ROAD MATERIAL EMBARGO.

Probably all officials, municipal, county and state, who are interested in street and highway construction know about what is known as Order No. 2 of the Priority Board, which prohibited after Nov. 1 the transportation in gondola cars of stone, sand or other materials used in constructing pavements. Some officials, and some (although we believe a less percentage) of the paving contractors at once threw up their hands on learning of this order and stated that all pavement construction would be stopped at once.

In our opinion this attitude is exceedingly unfortunate, and unnecessary if a little energy and grey matter would only be employed in searching for a solution of the problem undoubtedly presented. We believe that in the majority of cases the difficulty can be solved and that it will not be necessary, as so many have claimed, to stop all pavement construction immediately and for an indefinite period because of this order.

There are at least three general directions in which the solution may be looked for. One is the adoption of a pavement requiring a minimum amount of the materials covered by this order. (Asphalt, for instance, tar, cement, and other materials delivered in barrels may be transported in box cars, which are not covered by the order, and the former in flat cars.) Another general type of solution possible in many cases is the substitution of water transportation and truck hauling, either or both, for railroad transportation. The third is the more extensive use and adaptation of materials found locally. In many localities probably the most advantageous solution of the present difficulty would be found in a combination of all of these several kinds of solution. For instance, we may classify those as local materials, or confine our selection to those materials, which are found within a distance over which they may be hauled economically by truck or water, and we may modify the prevailing or preferred form of pavement construction so as to use such materials to the best advantage.

At the beginning of the war American manufacturers found themselves deprived of various essentials to the continuing of their business; for instance, dye stuffs of certain kinds had always been obtained from Germany, were manufactured nowhere else, and the German supply was now cut off. This situation had only to make itself positively manifest before American energy started to meet it by manufacturing in this country the dyes needed. It is possible that we have not yet entirely succeeded in this, but at least we have reached the point where no user of dyes is required to shut down or even abridge his operations for want of the necessary dyes; and many other branches of manufacturing and industry have solved similar problems.

The problem presented to city, county and state officials in connection with paving is no more difficult and should be met with equal energy and intelligence. For the time being many and perhaps the majority of localities are cut off from a supply of materials which they have been accustomed to use in paving work. They should no more resign themselves supinely to an entire abandonment of such work on this account than was done by manufacturers when European supplies of various materials became unobtainable. Several states have already made an investigation of the location, character and amount of all road-making materials within their limits, and this information should now be utilized to the fullest extent and amplified with a view to meeting the present emergency; while those states and cities that have made no such surveys should do so at once. Assuming that a large part of the force of many of the city and state highway departments now suddenly finds itself relieved from the supervision of construction work, why should not this engineering and inspecting force be directed immediately to devote all its time and effort to a thorough fine-combing of its own territory and that immediately adjacent for materials which can be used in road construction? While the testing department, which now will have no contractors' materials to test, can easily put in full time on the examining of those found by these scouting parties to determine their characteristics and in what way they can best be used in highway construction. We have two or three times expressed our belief in the advisability of such work, but we believe that recent events have made it one of the most imperative duties of the highway department of every state and city.

The highways and city streets absolutely must not be neglected. Many of them are no less essential to the prosecution of the war than are the railroads themselves, since they are the feeders of the railroads or the connecting links between several mediums of transportation. Deterioration in such pavements would be as serious a matter as in the railroads themselves, and such deterioration is much more likely to occur and will occur with much greater rapidity than in the case of railroads, owing to their less durability under heavy freight traffic.

This mattter of the necessity of roads in the prosecution of the war, and also that of substituting water and motor-truck transportation for rail transportation will be considered in succeeding issues. The point we wish to make this week is that, instead of dismissing their engineering force or resigning themselves to what is not necesarily inevitable, city and other highway officials should devote all their energies to an immediate solution

of the problem of obtaining available materials or the use of alternative methods of transportation in order to effect so far as possible a completion of contracts under way and suddenly interrupted; and also of collecting information, before snow interferes with their investigations, which can be used in planning work for next spring. Even though the Priority Board should permit partial or complete renewal next spring of rail transportation of road materials, the railroads will probably find it impossible to fully meet the demands made upon them in this respect. Paving contractors throughout this year have experienced embarrassing difficulty in obtaining materials for carrying on their work, and conditions next year are certainly not likely to be improved in this respect.

The necessity thus put upon paving engineers and contractors to search out and adopt new materials and new methods seems to be, and temporarily is, no doubt, a hardship; but we are not at all sure that, if met courageously and with a determination to continue pavement construction along those practicable lines which will give the best results, it will not prove in the end to be a blessing in that it will develop a more general and effective use of local materials in such a way as to secure equally good pavements at lower costs and with less unnecessary demand upon the transportation systems of the country.

ELECTROLYTIC SEWAGE TREATMENT FOR EASTON

The city council of Easton, Pa., on Nov. 10th passed a resolution accepting an offer of the Electrolytic Purification Co. "to demonstrate the electrolytic method of sewage disposal by the installation of a plant on one of the main sewerage lines, without any obligation on the part of the city other than the assumption of such part of the construction of the one-story building required for the housing of the machinery and the rearrangement of the sewer terminal as council may voluntarily assume." It is not yet known whether the council will make any appropriation for helping to defray the cost of this experiment, except that required for connecting the sewer with the plant. The appropriation ordinance for 1918 is now being prepared and will be introduced some time during December.

The Electrolytic Co. was eager to finish the foundation work of the building and plant before winter set in, and broke ground for the same on Nov. 12, two days after the formal acceptance of its offer. All who are interested in sewage treatment will be glad to learn that this demonstration is to be made, and it is to be hoped that the operation will be carefully inspected and checked up by some unprejudiced experts whose report on the matter will be accepted as authoritative by the company, the city, and sewerage engineers generally.

FIREMEN'S PENSIONS AND BENEFITS

Tabulation of Data Contributed by Fire Chiefs Covering These Points—Schools of Instruction for Firemen —Building Inspection by Firemen.

TABLE NO. 3—PENSIONS AND BENEFITS—INSTRUCTI ON AND INSPECTION.—Continued.

City and State.	Have firemen benev- olent or similar organi- zations?	Is there a pension fund?	What proportion does city contribute?	In case of accident, who pays the award?	What percent. is paid by city and what by association?	Is there a school or other or- ganized in- struction?	Do men inspect bldgs. to learn condi- tions?
Massachusetts							
Belmont	Yes	No		Relief fund		No	No
Beverly	Yes	State		Assn.		No	Yes.
Brockton	Yes	Yes	All	City pays salary 13 weeks; also local and state funds pay $1 per day		Yes	Yes.
Cambridge	Yes	No		Relief Assn.	Full salary	No	Yes.
Fitchburg	Yes	Yes	Half pay	Local relief fund			Yes.
Foxboro	Yes	No	None	Relief Assn.		No	Yes.
Framingham	Yes	Yes				No	Yes.
Gardner	Yes	No		Relief Assn.		No	No.
Gloucester	Yes	No		Relief Assn.		No	Yes.
Hingham	Yes	No		Relief Assn.		No	Yes.
Lawrence	Yes	Yes	All	Relief Assn.		No	Yes.
Lowell	Yes	No		City pays salary		No	Yes.
Lynn	Yes	No	All	Relief Assn.	Salary by city.	Yes	Yes.
Malden	Yes	Yes	Half salary	Relief Assn.		Yes	Yes.
Marblehead	Yes	No		Relief Assn.			Yes.
Middleboro	Yes	Yes	None	Relief Assn.	All by Assn.	No	Yes.
Milton	Yes	Yes	All	City pays salary	Doctor bills by Assn.		Yes.
New Bedford	Yes	No	Half pay	City pays salary		Yes	Yes.
No. Andover	No	No		Relief Assn.		No	Yes.
No. Brookfield	Yes	Yes	None	Relief Assn.		No	Yes.
No. Easton	Yes	No	None	Relief Assn.	All by Assn.	Some	Yes.
Peabody	Yes	No		Relief Assn.		No	No.
Quincy	Yes	Yes	Half pay	City and Relief Assn. $10.50 week, city, salary for 3 months		No	No.
Reading	Yes	No				No	Some.
Revere	Yes	Yes		Relief Assn.		No	Yes.
Salem	Yes	No	All	City		Yes	Yes.
Somerville	Yes	Yes	None	City		Yes	Yes.
Spencer	Yes	No	None	Relief Assn.			
Taunton	Yes	No	None	Relief Assn.	½	No	Yes.
Walpole	Yes	No	None	Relief Assn.			Yes.
Waltham	Yes	Yes	All	State and Local Assn.	All by Assn.	No	Yes.
Watertown	Yes	Yes	All	State and Local Assn.		No	Yes.
Wellesley	Yes	No	None	Relief Assn.	City pays sal'y	Yes	Yes.
Winthrop	Yes	No	None	Town		No	Yes.
Worcester	Yes	Yes	Half	Regular pay		Yes	Officers.
Michigan							
Albion	No	No	None			Yes	Yes.
Alpena	No	No		City			Yes.
Ann Arbor	No	No					Yes.
Battle Creek	No	No	None	City	All by city	Yes	Yes.
Cadillac				City			Yes.
Detroit	Yes	Yes	All	City has all		Yes	Yes.
Grand Haven	No	No		City		No	Yes.
Greenville	No	No		Insurance Co.		No	Yes.
Hillsdale	No	No	Liability Ins.	Insurance Co.		Yes	Yes.
Holland	No	No		City			Yes.
Iron Mountain	No	No		City		No	Yes.

TABLE NO. 3—PENSIONS AND BENEFITS—INSTRUCTION AND INSPECTION.—Continued.

City and State	Have firemen benevolent or similar organizations?	Is there a pension fund?	What proportion does city contribute?	In case of accident, who pays the award?	What percent. is paid by city and what by association?	Is there a school or other organized instruction?	Do men inspect buildings to learn conditions?
Michigan (Continued)							
Manistee	No	No		City	50-50		Yes.
Lapeer	No	No		City		No	No.
Marquette	No	No		City		No	
Pontiac	No	No				No	No
Wyandotte	No	No				No	Yes.
Minnesota							
Albert Lea	Yes	No	None	Relief Assn.			
Anoka	Yes	No					Yes.
Bemidji	Yes	Yes	2 mills	Relief Assn.	All by Assn.	Yes	Yes
Chisholm	Yes	Yes		Relief Assn.		Yes	Yes.
Detroit	Yes	Yes	None	Relief Assn.	All by Assn.	No	Yes.
Duluth	Yes	Yes	1/10 mill tax	Relief Assn.	Assn. pays $2.50 day	No	Officers.
E. Grand Forks		No		Relief Assn.		No	
Fairmont		Yes	$500	Relief Assn.		No	Yes.
Hastings	No	No				No	Yes.
Little Falls	Yes			Relief Assn.			
Minneapolis	Yes	Yes	1/10 mill tax	Relief Assn.	All by Assn.	No	Yes.
New Ulm	Yes	Yes		City and Relief Assn.		No	Yes.
Pipestone	Yes	No	1/10 mill tax	City and Relief Assn.		No	Yes.
St. Cloud	Yes	Yes		City and Relief Assn.			Yes.
St. Paul	Yes	Yes	1/10 mill tax	Salary by city and Relief Assn.		No	Yes.
Stillwater	No	No		City pays wages			Yes.
Two Harbors	No	No	All	City		No	
Virginia	Yes	Yes		Assn.	50	Yes	Yes.
Willmar	Yes		$100 a year	Assn.			
Winona	Yes	Yes	None	Assn.		Yes	Yes
Mississippi							
Jackson	Yes	No		Relief Assn.		No	Yes.
Vicksburg	Yes	No		City pays expenses		No	Yes.
Missouri							
Cameron	No	No					Yes.
Carthage	No	No		City pays salary		No	Yes.
Chillicothe		No		None			Yes.
Hannibal	No	No		City pays salary			Yes.
Kansas City	Yes	Yes		Full pay by city	Assn. pays Dr. bills	Yes	Yes.
Moberly	No	No				No	Yes.
Poplar Bluff	No	No		City		Yes	Yes.
St. Charles	No	No					Yes.
St. Louis	No	Yes	½ of 1%	No accident liability		No	Yes.
Springfield	No	No		City		Yes	Yes.
Washington	Yes	No	None	Fire Co.	All by Fire Co.	No	No.
Webster Groves		Yes	City pays doctor bills			Yes	Yes.
Nebraska							
Nebraska City	Yes	Yes		State fund		No	Yes.
Norfolk	Yes			State law governs	No average	Yes	Regulars.
Nevada							
Reno	No	No	None	State insurance		No	Yes.
New Hampshire							
Concord	Yes	No		State Firemen's Assn. pays all		No	Yes.
Laconia	Yes	No	None	State Firemen's Assn. pays all		Yes	Yes.
Nashua	Yes	No	None	State Firemen's Assn. pays all		No	Yes.
New Jersey							
Flemington	Yes	Yes		Firemen's Relief Assn.			
Glen Ridge	Yes	Yes		Local Relief Assn.	All by Assn.	No	No.
Hackensack	Yes	Yes		City pays all		No	Yes.
Haddonfield	Yes	No		State Relief Assn.			Yes.
Hammonton	Yes	No	$394	Firemen's Relief Assn.		No	Yes.
Irvington	Yes	Yes		Town		No	Yes.
Jersey City	Yes	Yes	None	Relief Assn.		Yes	Yes.
Kenworthy	Yes	No		Relief Assn.		Yes	No.
Lambertville	Yes	No	None	Relief Assn.		No	Yes.
Millville	Yes	No	None	Relief Assn.		Yes	Yes.
Pitman				Relief Assn.			Yes.
Plainfield	Yes	Yes	1% salaries	City		No	Yes.
Roosevelt	Yes	No	None	Firemen's Relief Assn.		No	No.
New Mexico							
Raton	Yes	No	No	State Fund, city pays		Yes	Yes.
Roswell	Yes	Yes	No	State Fund, city pays		Yes	Yes.
New York							
Amityville	No	No	90%	Village		No	
Albany	Yes	Yes		City			Yes.
Auburn	No	Yes		None granted		Yes	Yes.
Buffalo	Yes	Yes	None	Pension fund		Yes	
Batavia	Yes	Yes	None	City		No	Yes.
Canastota	No	No	No			Yes	Yes.
Cohoes	No	No				Yes	Yes.
Corning	No	No	All	City			Yes.
Elmira Heights	No	Yes		Fire Council		Now being started.	
Freeport	No	No		Village pays all		No	No.
Fulton	Yes	Yes	$200 per year	Insurance Comp.	All by city		Yes.
Geneva	Yes	No		City pays all		No	Yes.
Gloversville	No	No				No	Yes.
Goshen	Yes	No	None	Dept.			
Herkimer	No	No		City			
Jamestown	Yes	No	Nothing	Assn.		No	Yes.
Johnson City	No	No					Yes.
Liberty	No	No		Village		No	Officers.
Mamaroneck	Yes	No	None	Benevolent Assn.		No	Yes.
Middletown	Yes	No	None	City pays $12; Assn. $5 per week		No	Yes.
New Rochelle	Yes	Yes	No	Benevolent Assn.		No	Chief and Inspec.
New York	No	Yes	91%			Yes	
Oswego	No	Yes	10% excise tax			Yes	Yes.
Patchogue				Village		No	Yes.
Peekskill	Yes	Yes	None	Dept. Trustees			
Plattsburgh	No	No	None	None paid		No	Yes.
Rome	Yes	Yes	All	Full time and Dr. bills		No	Yes.
Rye	No	No	None	Village pays part under state law		No	No.

TABLE NO. 3—PENSIONS AND BENEFITS—INSTRUCTION AND INSPECTION.—Continued.

City and State.	Have firemen benevolent or similar organizations?	Is there a pension fund?	What proportion does city contribute?	In case of accident, who pays the award?	What percent. is paid by city and what by association?	Is there a school or other organized instruction?	Do men inspect bldgs. to learn conditions?
New York (Continued)							
Scotia	No	No		Village		Yes	Yes.
Silver Creek	No	No		City		Officers ..	Yes.
Solvay	No					No	Yes.
Syracuse		Yes		City pays salary		Yes	Yes.
Tonawanda	Yes	No	None	Benevolent Assn.		No	No.
Utica	Yes	Yes		City		Yes	Yes.
Warsaw	No	No	None				Yes.
Watkins	No	No	None				
Westfield	No	No	None				No.
White Plains	Yes	No				No	Yes.
Yonkers	Yes	Yes	$5,000	Salary continued		Yes	Yes.
North Carolina							
Asheville	Yes	City carries liability insura		nce on firemen		Monthly..	Yes.
Durham	Yes	Yes	None	N. Car. Firemen's Assn			Yes.
Kinston	Yes	No		State Assn.		No	Yes.
Mooresville	Yes	Yes	None	State Ass'n			Yes.
Raleigh	Yes	Yes		City and Assn.	City 1/3	Yes	Yes.
North Dakota							
Jamestown	Yes	No	$200			No	Yes.
Valley City	No	No					Yes.
Williston	No	No	$600				Yes.
Ohio							
Akron	Yes	Yes	Enough to pay pensions	City pays all		Yes	Yes.
Alliance	No	No	Salary	State Ins. Co.		Yes	Yes.
Ashland	No	No		City		No	Yes.
Bellaire		Yes	All				Yes.
Bellefontaine	No	No		City pays salary		Yes	Yes.
Bryan	No	No				No	Yes.
Carrollton	No	No	None			No	No.
Cleveland	Yes	Yes	40%	Placed on pension		Yes	Yes.
Columbus	Yes	Yes	100%			No	Yes.
Conneaut	Yes	No		State		Yes	Yes.
E. Cleveland	No	No				Yes	Yes.
E. Palestine	Yes	Yes	No	Company		No	No.
Elyria	No	Yes	All	City		Yes	Yes.
Findlay	No	No	None			No	Yes.
Greenfield	No	No		City		Yes	Yes.
Jackson	No	No		State Comp.			Yes.
Kenton	No	No				Yes	Yes.
Lakewood	No	No		State Comp.		Yes	Yes.
Lebanon	No	No				No	Yes.
Lima		Yes	1/10 mill	City pays all		No	Yes.
Lorain	No	Yes	All but small amount	All by city		No	Yes.
Marietta	No	No		City		Yes	Yes.
Martin's Ferry		Yes				Yes	At times.
Middletown	Yes	Yes		City		No	Yes.
Mt. Vernon	No	No				No	Yes.
New Philadelphia	No	No					Yes.
Oberlin	No	No		State Ind. Comm.		No	Yes.
Orrville	No	No					Some.
Portsmouth	Yes	No		City		Yes	Yes.
Springfield	Yes	Yes	About ½	City	50-50	Yes	Yes.
Toledo	Yes	Yes	Nothing to relief; all to pension	Both		No	Yes.
Warren	No	Yes	All	City pays salary		To some extent..	Yes.
Youngstown	No	Yes				Yes	Yes.
Oklahoma							
Ada	Yes	Yes	No	State Ins. Fund		Yes	Yes.
Bartlesville	Yes	Yes		Relief Assn.		Yes	Yes.
Chickashaw	No	Yes		State Assn.		Yes	Yes.
Hugo	No	Yes		State Assn.	All by Assn.	No	No.
Miami		Yes	None	State Assn.		No	Yes.
Sapulpa	Yes	Yes	Salary	State Assn.		Yes	Yes.
Oregon							
Astoria	No	No				Yes	Yes.
Baker	Yes	No	None			Yes	Yes.
Roseburg	No	No				No	Yes.
Marshfield	No	No		City pays all			Yes.
Pennsylvania							
Altoona	Yes	Yes		Firemen's Relief Fund state comp.		No	Yes.
Bangor	No	No		Relief Assn.		No	No.
Beaver Falls	Yes	Yes		Relief Assn.		No	Yes.
Bellwood	Yes			Relief Assn.		No	Yes.
Blairsville	Yes	No	$150 year	Fire Co.		Drills	Yes.
Bristol	Yes	No	None	Relief Assn.		No	No.
Brookville	Yes	Yes		Relief Assn.		No	No.
Carlisle	Yes	No	None	Relief Assn.		No	Yes.
Clearfield		Yes		Relief Assn.			
Connellsville	No	No		Relief Assn.		Yes	Yes.
Duquesne	No	No	All	City			
Easton	Yes	No	None	Relief Assn.		Yes	Yes.
Franklin	Yes	Yes	All	City		Yes	Yes.
Girardville	Yes	No	None	Relief Assn.	All by Assn.	No	No.
Jeannette	No	No		Borough pays all			Yes.
Jersey Shore	Yes	No		Relief Assn.	All by Assn.	No	Yes.
Lansford	Yes	No		Relief Assn.	All by Assn.	Yes	Yes.
Latrobe	No	Yes	None	Relief Assn.	All by Assn.	No	No.
Lehighton	Yes	Yes	None	Relief Assn.	All by Assn.	No	No.
Mt. Union	Yes	No	None	Relief Assn.		No	Yes.
Oil City	Yes	No	None	Relief Assn.	City pays sal'y	No	Yes.
Philadelphia	**Yes**	**Yes**				Yes	
Pittsburgh	Yes	Yes	$30 per man	Relief Assn. pays $700; city pays ½ salary; city pays $1,000 for death or disability		Yes	No.
Plymouth	No	No		Relief Assn.		No	Some do.

TABLE NO. 3—PENSIONS AND BENEFITS—INSTRUCTION AND INSPECTION.—Continued.

City and State	Have firemen benevolent or similar organizations?	Is there a pension fund?	What proportion does city contribute?	In case of accident, who pays the award?	What percent. is paid by city and what by association?	Is there a school or other organized instruction?	Do men inspect bldgs. to learn conditions?
Pennsylvania (Contin'd)							
Pottstown	Yes	No		Relief Assn.		No	Some do.
Quakertown	Yes	No	$250	Relief Assn.		No	Yes.
Reading	Yes	No		Relief Assn.		No	Yes.
Sunbury	Yes	No	None	Relief Assn.		No	Yes.
Turtle Creek	No	No	None			No	Yes.
Tyrone	Yes	Yes	None	Relief Assn.		No	No.
Uniontown	Yes	Yes	None	Relief Assn.		No	Yes.
Warren	Yes	No	None	Relief Assn.		No	Yes.
West Chester	Yes	No		Relief Assn.		No	Yes.
Wilmerding	No	No		Borough		No	Yes.
Rhode Island							
Central Falls	No	No		State		No	Not yet.
Woonsocket	Yes	No		City and Assn.	Salary and $5 wkly. by Assn.	No	Yes.
South Carolina							
Charleston	Yes	Yes	City pays full salary	State Relief Assn.		Yes	Yes.
Darlington	Yes	Yes	No	State Relief Assn.	All by Assn.		Yes.
South Dakota							
Aberdeen	Yes	No		Association		Yes	Yes.
Lead	No	No		City	City pays all.	Yes	Yes.
Watertown	No	No	None	City		Yes	Yes.
Tennessee							
Chattanooga	Yes	Yes	All	City			Yes.
Clarksville	Yes	No		City pays regular sal'y		No	Yes.
Cleveland	No	No	None			Yes	Yes.
Greenville	No	No	None	City			
Humboldt	No	No				No	Yes.
Jackson	No	No		City pays all		No	Yes.
Johnson City	No	No	None			Partly	Yes.
Knoxville	No	No	All	City		Yes	Yes.
Nashville	Yes	Yes	1/10 mill	City pays all		No	Yes.
Paris	No	No					Yes.
Texas							
Amarillo	No	No				No	Yes.
Austin	No	No		No award		No	No.
Dallas	No	Yes	1% of salaries.	City		No	Yes.
Denison							Yes.
El Paso	Yes	No	None	Assn.		Yes	Yes.
Georgetown	No	No				Yes	Yes.
Houston Heights						Yes	Yes.
New Braunfels	Yes	Yes	No	Dept.		No	Not Reg.
Palestine	No	No		City			No.
Port Arthur	No	No					Yes.
San Marcos	No	No					
Seguin			$80				
Victoria	Yes	Yes		City pays all		Yes	Yes.
Utah							
Brigham	Yes	Yes	None	State Assn.	All by Assn.	No	Yes.
Logan				State Assn.			Yes.
Ogden	Yes	No	None	State Assn.		Yes	Yes.
Salt Lake City	Yes	No	None	State Assn.	All by Assn.	Yes	Yes.
Vermont							
St. Johnsbury	No	No		City pays salary and expenses		No	Yes.
Virginia							
Bedford	Yes	No		Company		No	No.
Charlottesville	No	No				No	Yes.
Lynchburg	Yes	No	None	Relief Assn.		Yes	Yes.
Newport News	Yes	Yes		Association	All by Assn.	No	Yes.
Roanoke	No	No		City		Yes	Yes.
Staunton		No				No	Yes.
Washington							
Bellingham	No	Yes	None	Pension Fund	1½% from sal.	No	Yes.
Ellensburg	No	State		City		No	Yes.
Olympia	No	No	All	City pays salaries		Yes	Yes.
Port Townsend	Yes	Yes				Yes	Yes.
Puyallup		Insurance		City			
Seattle	Yes	Yes	$25,000 per yr.	Pension Fund	All by fund	No	Yes.
Tacoma	Yes	Yes	½ mill tax	Pension Fund		No	Yes.
Walla Walla	No	Yes	All	City		Yes	Yes.
West Virginia							
Fairmont	No	No		City		Yes	Yes.
Keyser	Yes	No	None				
Martinsburg	No	No				Yes	Yes.
Wheeling	Yes	Yes	$3,500 a year		80%	No	Yes.
Wisconsin							
Antigo	No	Yes	2% of salaries.	City		No	Yes.
Appleton	No	Yes		City pays all but 1% of salaries contributed by firemen		Yes	Yes.
Ashland	Yes	Yes		City		No	Yes.
Grand Rapids	No	No					Yes.
Jefferson	No	No					Yes.
La Crosse	Yes	Yes	2% Ins. tax	City pays salary, assn. $2 a day		No	Yes.
Manitowoc	Yes	Yes	2% Ins. tax			Yes	Yes.
Merrill	Yes	Yes	2% Ins. tax	Pension Board			Yes.
Milwaukee	Yes	Yes		Members contribute 2½% of salary, city pays rest; pension is half salary			Yes.
Oshkosh	Yes	Yes	2%	State Comp. Fund		Yes	Yes.
Portage	No	No		State Comp. Fund		Yes	Yes.
Rhinelander	No	No		State Comp. Fund		Yes	Yes.
Shawano	No	Yes	All	City			
Stoughton		Yes	2%				
Superior	Yes	Yes	All but 1%			Yes	Yes.
Wyoming							
Evanston		No	None	Have none		No	No.
Canada							
Westmount	Yes	Yes	$1,000 a year	Men pay 5%			Yes.

The WEEK'S NEWS

Highways and the National Defense—Good Roads for Illinois Counties—Milk Regulation in Indiana—Sewer Improvements in Ohio Cities—New York's New Fire Alarm System—Chicago's Policewomen—Oregon Fire Marshal at Work—New Government Reforms for Detroit, East St. Louis, Cincinnati and Tucson—Canton to Use Prisoners on Street Cleaning—United States Supreme Court Declares Race Segregation Unconstitutional—Action Against Official Coal "Confiscation"—Zoning in San Francisco.

ROADS AND PAVEMENTS

Highways Commitee for National Defense.

Washington, D. C.—Director W. S. Gifford has announced the creation of a Highways Transport Committee of the Council of National Defense, the functions of which will be to utilize the highways of the country to relieve the traffic burden on railroads, waterways and other transportation lines and also to co-operate with local highway officials in the adequate maintenance of necessary public roads for service during the war. The committee consists of Roy D. Chapin, president of the Hudson Motor Car Company, chairman; Logan Waller Page, director, Office of Public Roads, United States Department of Agriculture; Henry G. Shirley, chief engineer, Maryland State Roads Commission, and George H. Pride, president, Heavy Haulage Company, New York City. Other members will probably be added to the committee later. According to an accompanying statement by director Gifford, the personnel of the committee will mean the application of broad knowledge and experience in highway construction and traffic operation to vital war problems. Mr. Chapin is a vice-president of the Lincoln Highway Association and has for the past half year been working for the creation of some means to deal with the problems to be taken up by the new committee.

No Embargo Exception For California Roads.

Sacramento, Cal.—No exception in the case of California will be made in the order enforcing the embargo on the use of open cars for hauling materials for highway construction, according to a telegram received at the offices of the state highway commission from Robert S. Lovett of the war industries board at Washington. The commismission telegraphed to Lovett and H. L. Naftzger, vice-chairman of the state council of defense, saying the embargo threatened a complete tie-up of the state highway construction programme, and asked for an exception because the work "was vital to the nation as well as the state." Lovett's reply said: "I feel the order should remain unimpaired by exceptions which would form a precedent which would break down the rule." He suggested the use of box or flat cars in an emergency, and promised the order would be revoked "as quickly as the critical stage of necessity had passed." A. B. Fletcher, chief engineer of the commission, said the Natomas Company, which has a contract for furnishing a large part of the rock, sand and gravel for highway construction, expected to reduce operations to only two days a week because of inability to get cars. The company has a standing order for sixty cars daily. Comparatively few flat cars are available, Fletcher said, and the gondola cars have been taken over by the government for hauling ore, coal and coke.

$1,000,000 Road For Cook County, Ill.

Chicago, Ill.—The proposal to issue $1,000,000 by the county to provide for the construction of 48 miles of concrete roads outside the city limits was approved at the recent election by a substantial majority. This mileage will mean the completion of five through routes. Some of the money will be utilized in the improvement of about twelve miles of the Lincoln highway from the Indiana-Illinois state line to Chicago Heights, and in the improvement of the Chicago-Wisconsin state line road in Cook county and another road from Chicago to Joliet connecting with the Lincoln highway at that point. Announcement to this effect was made by W. G. Edens, Chicago consul of the Lincoln Highway Association. The most important improvement is probably Cook county's part of the so-called military road, starting at the Milwaukee avenue pavement in Niles and running north to the county line. The continuation of this, provided for by Lake county, lies just to the west of the north shore towns as far as Waukegan, and will afford a direct route for north and south travel, unimpeded by the congestion on Sheridan road and the delays involved in passing through one suburb after another. On the military road to the north $75,000 of state and federal aid funds are available if the county meets the rest of the estimated cost, or $156,000. The other routes must be improved by the county alone, at an estimated average cost of about $20,000 a mile. Virtually the entire amount to be spent under the bond issue, however, will be refunded to the county from automobile license fees if the $60,000,000 state bond issue is passed next year. A week before this election, Lake county voted in favor of a $500,000 issue for roads. The approval of the voters of both the counties was necessary to obtain state and federal aid for the Chicago-Milwaukee road.

SEWERAGE AND SANITATION

New State Milk Regulations to Improve Supplies.

Indianapolis, Ind.—New milk regulations which have been adopted by the state board of health will be in force January 1, 1918, according to an announcement by Dr. J. N. Hurty, state health commissioner. When promulgated, the rules, according to two decisions handed down by the Indiana supreme court, will have to be strictly enforced. The new rules are intended to make the milk supply as pure and safe as is the supply in any state. If it were possible to obtain perfectly pure milk in Indiana for one year, state health officials estimate a saving of at least 2,000 lives would result. This estimate is based on the fact that about 4,000 infants die annually of intestinal disorders, and state officials say 50 per cent of these cases are due to polluted milk. Commenting on the situation, Dr. Hurty said: "If only ten children were killed annually in Indiana by polluted milk, it would be worth while to put forth strenuous efforts to secure pure milk and save that number of lives. The Indiana law declares that milk containing visible dirt is unlawful and condemned. Any health officer finding milk in bottles, in cans or in any container whatever, which contains visible dirt, should seize the same, take it before the judge of the court or a justice of the peace and lay accusation against the person who sold the milk. This visible dirt is usually small particles of manure, carrying millions of putrefactive and fermentative germs. Great good for the public health will be secured through grading milk. The grades adopted are those approved by the national milk standards committee. The new grading is as follows:

"Grade A. Raw Milk.—Milk of this grade shall come from cows free from disease as determined by tuberculin tests and physical examinations by a qualified veterinarian, and shall be produced and handled by employes free from disease as determined by medical inspection by a qualified physician, under sanitary conditions, such that the bacterial

count shall not exceed 10,000 per cubic centimeter at the time of delivery to the consumer. It is recommended that dairies from which this supply is obtained shall score at least 80 on the United States bureau of animal industry score card.

"Pasteurized Milk. Milk of this grade shall come from cows free from disease as determined by physical examinations by a qualified veterinarian, and shall be produced and handled under sanitary conditions, such that the bacterial count at no time exceeds 500,000 per cubic centimeter. All milk of this class shall be pasteurized under official supervision, and the bacterial count shall not exceed 10,000 per cubic centimeter at the time of delivery to the consumer. It is recommended that dairies from which this supply is obtained shall score at least 85 on the United States bureau of animal industry score card.

"Grade B. Milk of this grade shall come from cows free from disease, as determined by physical examination of which one each year shall be by a qualified veterinarian, and shall be produced and handled under sanitary conditions, such that the bacterial count at no time exceeds 1,000,000 per cubic centimeter. All milk of this class shall be pasteurized under official supervision and the bacterial count shall not exceed 50,000 per cubic centimeter when delivered to the consumer.

"Grade C. Milk of this grade shall come from cows free from disease as determined by physical examination, and shall include all milk that is produced under conditions such that the bacterial count is in excess of 1,000,000 a cubic centimeter. All milk of this class shall be pasteurized or heated to higher temperature, and shall contain less than 500,000 bacteria a cubic centimeter when delivered to the consumer."

"Milk dealers shall be required to have a permit or license to sell any grade or class of milk and to use a label for such grade or class. Such permit or license shall be granted only after the local health department has determined that the milk of the dealer actually belongs to the grade, and it shall be revoked and the use of the label forbidden when it is determined that the milk is not in the grade or class designated.

"All milk shall be labeled and marked with the grade in which it is to be sold. Besides the letter of the grade, that is 'Grade A,' 'Grade B,' 'Grade C,' and the words 'raw' or 'pasteurized,' the label shall also show the name of the producer or distributer.

"Milk not suitable for human consumption may be sold for industrial purposes, provided it be heated to a higher temperature than necessary for pasteurization, and delivered in a distinctive container plainly marked with the words: 'Not suitable for human consumption" in letters not less than one-fourth inch in length and one-twelfth-inch stroke.

"The tuberculin test required in the case of cows producing 'Grade A' milk shall be administered only by qualified veterinarians who have been authorized to make the test by the state veterinarian.

State Health Board Demands Improvements.

Watervliet, N. Y.—Dr. Godfrey of the state board of health has warned the city health board that the city must do more than provide for a new water supply to check typhoid. Dr. Godfrey said that some immediate action would have to be taken to do away with the many outside vaults. He also said that the state would prosecute physicians living outside the city who had not reported typhoid cases. It was brought out that in spite of the fact that the board at its last meeting had directed the school board to furnish suitable drinking water in the public and parochial schools the order was not being obeyed.

Electrolytic Sewage Disposal Demonstration.

Easton, Pa.—The city council, at a special meeting, has accepted the offer of the Electrolytic Purification Company, Philadelphia, Pa., to install a demonstration sewage-disposal plant here, and work has already been begun on the plant. H. J. Hirst, representative of the company, stated that his firm would stand all the expense of constructing a temporary building, installing the necessary equipment and machinery and all costs, as an evidence of its good faith. It will not ask the city to obligate itself to buy the plant unless it is proved that the operation is a success. All that the city will do will be to appropriate a nominal sum in its next year's budget to cover the cost of electric power, the lime that is used by the process, and the expense of the foundation work, making connection with the present sewer, etc.

Damage Suits Follow Inefficient Plant Operation.

Salem, O.—The W. J. Sherman company, of Toledo, has been engaged by the city to investigate the condition of the sewage disposal plant and to report on necessary improvements. This action follows the institution of nearly a score of damage suits by riparian owners located below the plant who have been continually affected by the poor operation of the plant and its production of a bad effluent. City officials blame the conditions on inefficient operation and handicap by the use of bad material in the filters and by insufficient capacity. Operation of the plant was begun in 1913 after the state health board had ordered the elimination of the pollution of First Culvert creek. Owing to lack of a sufficient appropriation the plant was built to handle only a million gallons of sewage per day. With the growth of population the plant is now attempting to treat almost three times as great a volume. Storm water, which is allowed to enter the plant from an extensive sewer system, has overburdened the plant. Another reason given for improper operation of the plant is the poor quality of the material used in the filters. When the state health board approved the plans for the plant it required the use of a proper grade of sand, and after difficulty in obtaining this the board approved the use of a certain bank sand. After operation for some time the instructions given by the board for removing the sand were disregarded and considerable quantities of loam found its way into the filters, making operation considerably slower.

Sewer Bond Issues in Ohio Cities.

Cleveland, O.—The voters at the recent election approved by only a small majority the proposal to issue $3,000,000 bonds for the construction and repair of sewers. The measure was favored by the Cleveland Chamber of Commerce.

Cincinnati, O.—By the vote of 42,255 in favor and 26,766 against, the proposal to issue $500,000 bonds for sewer construction failed, the requisite majority not being obtained. It was planned, with the money, to continue the construction of the intercepting sewer system. The result of the election will mean the extreme modification of the plans of city engineer Krug.

Toledo, O.—By a vote of nearly two to one the citizens at the recent election approved a bond issue amounting to $2,800,000. According to the plans of commissioner of engineering and construction H. C. McClure, $700,000 will be expended in a short time for a number of sewerage improvements, including the Ten-Mile Creek interceptor and the Bay View pumping plant, which will involve about six miles of sewers and two siphons.

Health Campaign Reaches Many.

Minneapolis, Minn.—The committee in charge of "Health and Happiness week" kept count of the number of persons who heard talks on health or saw health films, the columns of newspaper space and other facts, in order to learn the scope of influence of this educational campaign. Talks were given in 41 schools and high schools before 34,800 children; 13 factories to 1,000 people; 3 banks, to 150; 3 hospitals, to 200; 4 labor unions, to 400; 7 private schools, to 2,571; 21 churches, to 4,200; 13 other meetings, to 1,510. Films were shown in 20 theaters and 2 schools to 69,000. It is estimated that 40,000 people saw the health parade. Many of these figures are estimates, but conservative ones. Thus, a total of 149,621 persons were reached in a personal way at an expense (including that of the tuberculosis conference) of about $900, or a little over one-half a cent per person. In addition, requests have been received for 28 other talks to be given at some other time. Furthermore, by actual count, "Health and Happiness week" and the tuberculosis conference were given 51 columns of newspaper space.

WATER SUPPLY

District City for Water Payments.

Lincoln, Neb.—The city commission has passed an ordinance reorganizing the system of water payments. Beginning after January 1 the city will be divided into three districts, A, B and C. Those who are classified by commissioner Schroeder as residents of district A will pay their water bill on January 1, April 1, July 1 and October 1. Residents of district B will call on the cashier the first of February, the first of May, the first of August and the first of November. Those of district C will pay up March 1, June 1, September 1 and December 1. The ordinance also adds to the burden of penalty. The present payment plan provides a five per cent fine against all bills not paid when due. The fine has been no greater whether payment is three months or one day late. The new ruling is as follows: "If any water bill shall be

in arrears for ten days after the same shall be due, five per cent thereof shall be added as a penalty. And, if any water rent or penalty be not paid within a period of thirty days after the same becomes due, the water shall be turned off and the service not renewed until all arrears and penalties are paid, including the further sum of one dollar, being the cost of labor for renewing the service." Heretofore all water bills have come due at one time. This has meant a piling up of work. Six meter readers have covered the ground during the quarterly crush. Patrons have complained of the necessity of standing long in line at the cashier's window. The new plan will reduce the crush at the window by two-thirds. The first of every month will be the time for quarterly payment by one-third of the water users of the city. Instead of keeping six readers on the job for a part of the time, two will work the meter circuit all the time. The new plan is expected to simplify the general scheme and to prove satisfactory both to the city and the water patrons.

State Board Approves Water Supply Plans.

Hamilton, O.—The state board of health has given its approval to service director H. R. Garver's plan for improving the city water supply, with only minor changes. Several months ago the firm of Mead & Seastone made an inspection of the city water works system and made recommendations for its improvement from which the service director prepared his plan. It is planned to drill three new ten-inch tubular wells, each to be 150 feet deep, and install new piping and equipment at the well basin. The state board has approved the plan, subject to the following conditions: First—That tests be made to show the quantity and quality of the water to be obtained—that the excavation surrounding the supply wells be filled with clean dirt to the level of the ground outside the levee. Third—that the contract for the work be awarded by January 1, 1918. The estimated cost of the work is $16,000, and there is only $10,000 available. Council has been asked to make an additional appropriation.

Company Need Not Furnish Water at Loss.

Belfast, Me.—"If the municipality avoids payment for that part of the service rendered it, the inhabitants of the municipality must make it up. There is no presumption that it is the respondent's duty to furnish water at a loss." This is the comment of the public utilities commission on the situation in Belfast as disclosed in the complaint of Wilmer J. Dorman against the Belfast Water Co., in a decision rendered dismissing the complaint. The city of Belfast and the predecessors of the Belfast Water Co. entered into a contract, November 15, 1886, in which the contractors agreed to build a water works; to supply Belfast hydrant service for a fixed annual rental during 20 years, and thereafter forever free; to furnish water for schools and all other public purposes in return for exemption from taxation; and that the "charges or rates for water supplied for domestic and other purposes shall not exceed those in other towns and cities of Maine of the general size and circumstances of Belfast and similarly situated. After the expiration of the 20 years on nearly all of the hydrants, the hydrant rental ceasing, the water company increased its domestic rates. Later, it undertook to collect further hydrant rentals, on the ground that failure to collect this rental and placing the whole charge on the domestic users was unjustly discriminatory and unlawful under the Public Utilities Act. This case went to the courts, and it was there held that the original contract still was operative as to hydrant rentals—the only question then up. The company then made a further advance in its domestic rates to meet losses in expenses and fixed charges. The complainants alleged that these new rates were higher than those charged for similar uses in other towns and cities of the same population, and, therefore, a violation of the contract. They rested their case entirely on the contract, contending that it did not make any difference whether the rates were sufficient to meet expenses, or what the conditions were in the towns and cities with which comparison was made. The decision of the commission traces the history of the contract and of subsequent action by the state legislature, and holds that, whatever may have been true of the attempt to fix rates for fire service, the city never had had any right to fix the domestic rates by contract; that the state itself, in the charter of the Belfast Water company, reserved and undertook to exercise that right; that, in enacting the public utilities law, it changed the method of regulation by requiring that rates shall be reasonable according to the value of the property and a fair return thereon. The decision holds that "the power to make such change is too generally recognized to be seriously questioned. Assuming even that the city's attempt to regulate was not superseded by the action of the legislature, 'it was competent for the legislature to waive any contract rights of one of its political subdivisions.'" The decision refers to the earlier decision in one case of the Augusta Water District. "If we are right in the view," continues the decision, "that the provision contained in the contract is inoperative, it is not necessary to consider what that provision means. The complainants' theory is that it arbitrarily limited the respondent to individual rates no higher than those charged in other towns and cities of the same population, regardless of whether the water is pumped or supplied by gravity flow, whether it has to be filtered or can be used raw, whether the plant is taxed or exempted from taxation, whether the population is reached in a densely settled area or through an expensive distribution system, whether the municipal service is paid for or furnished free. In fact, they would ignore every element that really determines the cost of service."

Unpaid Water Bills Not Lien on Property.

Rochester, Pa.—A water company has no right to require the buyer of a property against which there was an unpaid water bill to pay it, according to a decision of the Public Service Commission at Harrisburg, handed down by commissioner Alcorn, in the case of the Rochester Building and Loan Association vs. the Beaver Valley Water Company. "No good reason has been advanced why a water company should have a privilege not claimed by other public service companies, or should have a more summary method of collecting its debts than other corporations," says the opinion. "If we decide that such a rule as applied by this respondent is reasonable we give to the respondent a permanent lien. It can allow the water rent to run in arrears as long as it pleases and exact payment from a party who may buy the property, although he did not incur the debt. It would make it a lien superior to a tax claim or a mortgage. . . . There is no similarity between a tax and water rent. No good reason exists why a preference should be given to water rents over any other debts. It is in the power of the water company to protect itself by requiring security or a deposit."

FIRE AND POLICE

New Alarm System for New York.

New York, N. Y.—New street fire-alarm boxes are now being installed at the rate of twenty to thirty a day as part of the new and modern system which is to give Manhattan twice its present number of boxes, fire commissioner Adamson announces. About four hundred of the new boxes have already been installed. The new system, which the fire commissioner expects to have finished by the close of the year, will be one of the most complete in any city in the world. It will not only double the number of boxes on the existing system in Manhattan, but it will quadruple the number of circuits. Where there are 816 fire-alarm boxes now there will be 1,651 in the new system. In addition, there will be no more than ten boxes on any one circuit, and the circuits will be so arranged as to preclude the possibility of a general breakdown, always a danger under the present antiquated system. The new fire-alarm headquarters in Central Park, it is announced, is ready to be opened as soon as the installation of boxes throughout the borough is completed. The equipment here is a departure from that used

in any other city. One main switchboard encircles the operating room, leaving the fire alarm telegraph operators in a central position from which they can observe the receiving and transmitting signals on various panels throughout the room. Devices have been installed to give a check on every signal so that any circuit on which there are difficulties can be at once isolated from the others for special treatment by the inspectors and wire chief. The plans for the new system were drawn up in 1914 after a decade of agitation for a new system which had no practical results. Before the present administration $1,609,272 in corporate stock had been appropriated for a new system, but adequate plans were never completed, the work proceeded haltingly, some of the money was diverted to the maintenance of the existing system, and the city remained on the old basis as far as fire-alarm protection was concerned. The cost of the new system, planned and rapidly nearly completion under commissioner Adamson, will be approximately $3,000,000. Of this sum, however, $1,600,000 is for subway construction, which the present administration has required the subway company to install without cost to the city under the terms of its franchise. The net cost to the city, therefore, will be approximately $1,400,000. Fire commissioner Adamson has arranged with the Insurance Exchange for a horizontal reduction of 1 per cent in insurance rates on the completion of the new system.

Eight-Hour Day For Firemen and Police.

Cleveland, O.—The voters at the recent election approved by a two-to-one majority the charter amendment extending the eight-hour day to all city employees in the classified service. The eight-hour day and forty-eight hour week is specifically extended to the fire and police departments. In large space paid advertising the Cleveland Chamber of Commerce approved all the other propositions submitted to the voters at this election but worked against this amendment on the ground that "it would seriously interfere with this service and place a prohibited financial burden on the city."

Chief Commends Work of Policewomen.

Chicago, Ill.—Chief of police Herman F. Schuettler gives his twenty-nine "copettes" full credit for excellent work. After going over the detailed records of the policewomen he declared that they were not only efficient in a marked degree, but that they were deserving of praise from him and from the citizens of Chicago instead of censure. This was the chief's formal reply, based on the records, to the criticism voiced by the September Grand Jury with respect to women doing certain lines of police work: "If all the civic societies of Chicago should ask me to dispense with these policewomen I wouldn't do it," said the chief. "I wouldn't do it because it is my duty to do the best I can for the police department of Chicago, and I consider that these policewomen are doing first class work. Not a one of them has been before the trial board." The chief made public for the first time an outline of the duties of the policewomen which he prepared himself. It follows:

"Passenger depots—Policewomen have been detailed principally to cover the main railroad passenger depots. Their duties have been to keep the waiting rooms, etc., under surveillance to see that no advantage is taken of travelers, especially ladies and children and elderly men and those unable to speak English. They are particularly helpful to immigrants, and cooperate with the associations that have been established for their protection. They have handled a number of cases of runaway boys and girls (minors) arriving here from other cities.

"Complaints of undue attentions by men to unaccompanied young girls on incoming passenger trains are promptly investigated by the policewomen and actions taken to fit the case. This has a salutary effect upon so-called 'white slavers.'

"School and other stores—Here they find and eradicate petty gambling devices (slot machines, etc.), toys (such as pistols), the sale of which the ordinances forbid, the sale of cigarettes and furnishing of cigarette paper to minors, and handle complaints in general against these stores. A number of slot machines have been confiscated by them, a number removed upon warning, and a number of proprietors of the stores prosecuted.

"Questionable flats and shady hotels have been investigated by policewomen with good results. Evidence has been obtained by them against these places in some instances which has led to successful prosecution, and in other cases the guilty parties have vacated the premises.

"Dance halls—When policewomen were first assigned to dance halls it met with strong opposition on the part of the managers of these halls, but now their presence at the dances is welcomed and the conductors of the dances cooperate with them in every way. When the policewomen took up their work various forms of suggestive dances were being carried on. The policewomen showed tact and patience in correcting the objectionable features.

"Minors are kept away from these dance halls and special care is taken to see that no girls under age are allowed there.

"Cafes and restaurants—Policewomen see that girls and boys under age are not allowed in these places where drinks are sold.

"Saloons—Policewomen are noting violations of the 'family entrance' and 1 o'clock closing ordinances and the presence of unescorted women in saloons, also minors in or hanging about the entrance to saloons, and are taking steps to correct same.

"School buildings—On complaints from school principals and the board of education the presence about public school buildings of undesirable peddlers and street fakirs has been investigated by policewomen and these persons kept away from the same.

"Moving picture theaters—These are investigated by policewomen for violations of the ordinances. They also see that they are sufficiently lighted, note ventilation, etc. A number of complaints have been handled by them of improper attentions by men upon lady patrons, and arrests made, with good results.

"Crowds of young men hanging about the entrances of theaters, insulting and annoying girls and women, have been broken up by policewomen, who have also made arrests.

"The compelling of sufficient lighting in moving picture theaters has likewise improved disorderly tendencies of patrons.

"Vice cases, especially where young girls are involved, are investigated by policewomen, who are in position to, and do, get prompt and good results. Wayward girls are taken in hand, shown the error of their ways, and restored to their parents. Family conditions are looked into, and where the case warrants, same are taken to court."

Stringent Anti-Vice Ordinance.

Columbia, S. C.—An ordinance has been passed by city council prohibiting the transportation of women for immoral purposes within the limits of the city. The ordinance will go into effect immediately. The new ordinance makes it unlawful for a driver to use an automobile to carry any woman or women from any one part of the city to any other part for the purpose of immorality. It also makes it unlawful for any person to direct another person to an immoral house or to give any information of such a place. The ordinance also states that any persons who shall knowingly violate these rules shall be guilty of a misdemeanor and shall be fined not more than $100 or sentenced to serve thirty days.

Recommendations Follow Marshal's Survey.

Astoria, Ore.—Nine recommendations have been made after a survey of the utility subways in this city by the state fire marshal's department, which is operated under the supervision of insurance commissioner Wells. They are: That all service pipes and water mains, where the service pipe taps the main, should be properly covered with sand to such depth as to insure against freezing and accidents. That all openings be so nclosed that it will be impossible for any person or persons to enter a subway except through the proper channel. That no one be allowed to enter a subway without first obtaining permission from the fire chief. That an ordinance be passed by the city council designating some city official to make a weekly inspection of the entire subway and to report any defects found in any of the public utilities to the proper party and to see that same is rectified at once. That a lighting system should be installed. That a system of proper ventilation be installed at once. That water traps from the street be connected with sewer instead of being allowed to run over the ground. That cut-off valves should be placed at the intersection of every street on gas mains; also cut-off valves should be placed on gas mains just before entering subway. Additional manholes should be installed for the use of firemen in case fire should originate within the subway.

Albany, Ore.—Eight recommendations for the elimination of fire hazards are contained in a survey made of Albany by chief deputy fire marshal Fred Roberts and deputy marshals Pomeroy and Allen. They are: That the chief of the fire department be paid a salary sufficient to allow him to devote all of his time to the duties of his office. That the chief make inspections of all buildings in the city, including residences, and that reports cover-

ing such inspections be placed on file. That the council vest the chief with authority to enter and inspect buildings at any resonable hour. That the ordinance providing for the numbering of buildings and the installation of signs on all streets be strictly enforced. That an ordinance providing for the removal of buildings damaged by fire or decay to the extent of 60 per cent of their actual value be enforced. That at least five additional fire-alarm boxes be installed and also that additional hydrants be installed in the eastern section of the city. That hose carts be housed near Albany college and also in the east end of town. That the fire chief be empowered to order the discontinuance of electric service to any building if the owner, after having been advised that it is defective, does not have the defect remedied.

Investigate Big Hotel Fire.

Philadelphia, Pa.—The authorities are investigating the causes of the recent hotel fire, which destroyed the upper floors of a fashionable apartment house here. A woman was burned to death, another was seriously injured and four persons were rescued from fire-trapped rooms. Thousands of men and women packed in the street below were thrilled at the sight when captain George Diver, of truck company No. 4, emerged from a fire-framed window with the body of a woman in his arms. Diver carried her down a ladder from the seventh floor to the street and then returned to search for other guests. Smoke poured from the window and as the woman prepared to mount to the edge policemen yelled to her not to jump. Captain Diver then performed one of the most spectacular feats of bravery ever witnessed in this city. The truck was backed around on Clinton street and the fire tower was slowly raised to the height of the seventh-floor window. Diver seized a strap and clambered up the high ladder. As he neared the top the ladder leaned inward and rested on the wall of the building. He then took the woman and by a skillful manipulation of the strap tied her to his back and slid down the ladder to safety.

New Fire Alarm System Installed.

Biddeford, Me.—Within three months Saco will have a thoroughly modern and efficient fire alarm system as the result of the contract which has been signed with the Gamewell Fire Alarm Company. Work on the new system has been started. The primary battery system which has been in use for the past 25 years and which is now proving so unsatisfactory that it is almost a menace to the city, will be replaced by storage batteries. One hundred and fifty cells are to be installed. These are to be divided so that while one set is furnishing power the other will be in the process of being recharged. Current will be taken from the power wires. It will be transformed from an alternating to a direct current by a rotary tansformer. In addition to installing the storage battery system arrangements have been made for the purchase of nine miles of wire which will be used in constructing new alarm circuits throughout the city. The installation of the new system is expected to reduce the cost of maintenance.

GOVERNMENT AND FINANCE

Detroit Votes for Government Reform.

Detroit, Mich.—By an enthusiastic vote of 27,422 to 9,994 the voters approved the proposal to revise the charter. Nine men were chosen at the election to draft a new instrument. These are: Sherman D. Callender, Eugene S. Clarkson, Divie B. Duffield, Lee E. Joslyn, Paul H. King, John C. Nagel, William A. Petzold, Edward A. Van Husan, Richard M. Watson. Being the only candidates for charter commissioners they were elected without opposition. When they complete their work the charter they produce will have to be submitted to the voters at an election and adopted by them before it can become effective. The charter commissioners are morally bound to incorporate in the proposed new charter a provision for a small common council, to be elected on a non-partisan ballot at large, thus abolishing the ward system of representation, according to the decision of the voters. They gave the small council proposition a vote of 23,637 to 10,852. Othewise the charter commissioners are uninstructed. If a new charter has not been framed, adopted and put into effect before January 1, 1919, the common council will be reduced on that date to one alderman from each ward, or 21 in all, by virtue of an amendment carried by a vote of 18,966 to 16,331. There are now two aldermen from each ward. The 21-man council will then remain until it has been superseded by the small, non-partisan body, elected at large, providing a new charter, with that provision, is eventually ratified at the polls. Many of the provisions in the old charter will be taken over into the new charter. "The charter commissioners will find on investigation that many of the present provisions will have to stand unchanged in the new charter," says corporation counsel Dingeman. The charter commission has begun work, and the commissioners will try to have the revision work ready for submission to the voters at a special election in the spring. A number of other propositions were voted on, and only one was defeated. This was the bond issue for $3,000 000 for the construction of the Belle Isle bridge. While this proposal received a majority of votes, 20,694 to 17,890, yet the 60 per cent affirmative vote required was not obtained. There was doubt as to whether the law makes the three-fifths approval necessary, and action of the city is being postponed. While the corporation counsel declared that the people had approved the bridge construction and suggested the placing of the $3,000,000 in the tax levy, mayor Marx opposed any such interpretation of the result. The question may be again submitted to the voters. A proposition regarding the increase of pensions was approved by a vote of 27,939 to 9,980; one on planting trees received a favorable vote of 19,479 to 16,797; the construction of breakwaters was approved by 22,162 to 13,306; a system of dividing the work of tax collection was approved by the biggest majority, 25,573—31,167 to 5,594; the proposition to annex a part of the village of Hamtramck was given the next largest majority, 24,198—31,659 to 7,461. This proposal was, however, defeated in Hamtramck by a vote of 83 to 27, so the proposal will not become effective.

The Commission Election in East St. Louis.

East St. Louis, Ill.—The women of this city, who cast approximately 50 per cent of the total vote in the recent special election, almost solidly supported the commission form of government and brought about the adoption of the proposition by almost two to one. The vote was 4,784 in favor of the commission form and 2,454 against, a majority for it of 2,330. Only one ward gave a majority against the commission form. This was the first, which includes the district adjacent to the stockyards and inhabited almost entirely by laborers, many of whom are of foreign nativity. Nine scattering precincts in other wards gave majorities against the proposition. These also are centers of the workingmen's vote. The negroes, whose vote was claimed by the opponents of the measure, voted overwhelmingly for it. Mayor Mollman, who opposed the commission form, issued a statement after election in which he said he recognized there were many commendable features of the plan and that during the remainder of his term he would conduct his office as nearly in accordance with the principles of commission government as is possible under the existing laws. He said the five commissioners under the new form will be able to understand each other better and work in closer harmony than the sixteen aldermen under the present form. The biggest question confronting the commissioners, he said, when they take office will be that of revenue. He pointed out that many saloons have closed and that he expects at least 100 more to go out of business by January 1, decreasing municipal revenue $75,000 a year. The success of the proposal means that there will be a thorough reorganization of municipal functions, including the abolition of the old ward system. The chief advantages of the new form are: The direct fixing of responsibility, the referendum on

public service franchises, the publication of receipts and expenditures, and the referendum and recall for officials. No change can be made until April, 1919, as that is when mayor Mollman's term expires. When the term of eight of the sixteen city councilmen expires next April, eight more will be elected for the period of a year. Five commissioners will be elected in 1919. Their names will appear on the ballots in alphabetical order, and the five receiving the highest number of votes will be declared elected. They will then assign the departments by a majority vote. The commissioner assigned to the department of public affairs will be known as mayor, and will receive a salary of $4,500 a year. The other commissioners will get $4,000 each. The other departments are: Accounts and finances, public health and safety, street and public improvements and public property. The first will have charge of the work now done by the city treasurer and city comptroller. The commissioner of health and safety will have charge of the health department, and will have general supervision of the fire and police, although the police board will be continued. The commissioner of streets and public improvements will take charge of the work now done by the street commissioner and the board of local improvements, and the commissioner of public property will have charge of all public buildings and other city property. Under the new plan franchises to public service corporations may be granted only by a majority vote of the people. A statement of all receipts and disbursements must be printed in pamphlet form once a month and distributed to all persons desiring it. There must also be an audit of the books annually by a certified accountant. The law provides that the commissioners must devote all their time to the city's business. All meetings of the commission must be open, thus doing away with the "secret caucus," which has been a regular part of the city council's proceedings for several years.

Taxation of Motor Fuel Sales.

Salt Lake City, Utah.—Under the new city ordinance providing for the regulation of gas and oil sales and the taxation of wholesale and retail dealers in motor fuel, the city already has collected the sum of $389.25 for taxes on the remaining months of this year. This is shown in a report by the city license collection department, which has charge of the collection of money from this new source. The report shows that twenty-seven retail dealers and two wholesalers have paid their taxes. The ordinance provides as follows: "For inspecting oils, as in this ordinance provided, the city license assessor and collector shall collect yearly in advance from all dealers selling at retail and carrying a stock of more than ten gallons of gasoline or motor spirits the sum of $25, and from all dealers selling wholesale the sum of $250." Because of the few months which remain in 1917 the city has cut the specified amount of tax to $8.25 for retailers and $83.25 for wholesalers. The report shows that there still remain two wholesale dealers and ten retail dealers who have not yet paid their taxes. T. L. Irvine, city sealer of weights and measures, has warned the dealers of the provision which makes substitution or mislabeling a misdemeanor.

Votes for New Charter.

Cincinnati, O.—The new charter, which was approved by the voters at the recent election, is expected to allow the city to enjoy home rule without having to be subject to the regulation of the state legislature. Other important features embodied in the charter include the following: Four-year terms for all elective officers. City solicitor and city treasurer to be appointed by the mayor. The solicitor and auditor, who were chosen at this election, are to serve only two years; solicitor then to be reappointed by mayor and auditor to be elected for four years, so that the election of mayor and auditor would come alternately every four years. City council to consist of twenty-six members, elected from wards, and six at large, and to have full powers of legislation subject to existing state laws. Position of director of street railways to be created to have authority over local transportation system. City planning commission created to have full control over all matters relating to a city plan. Requirement of fees from civil service applicants eliminated. Medical control of hospitals is vested in university trustees and administrative control in director of public safety. Terms of university trustees fixed at nine years; park commissioners, six years; sinking fund trustees, ten years; rapid transit commissioners, ten years; board of health members, ten years. Consent of abutting property owners for the extension and operation of a street car line past his property not required, provided city planning commission approves the extension. At this election, also, deficiency bonds amounting to $1,340,000, as permitted by the legislature, were approved. Of this sum, $923,000 is to go to the public safety fund, $350,000 to the public service fund and $67,000 to the hospital fund.

Favor New Charter.

Tucson, Ariz.—By an almost unanimous vote of 341 to 27 the voters have approved the proposition to draw up a new charter. The entire charter ticket proposed by the People's Charter Committee was elected as a board of freholders to frame the new instrument.

STREET CLEANING AND REFUSE DISPOSAL

To Install Crematory.

Anniston, Ala.—Mayor L. L. Scarbrough and the sanitary committee of the city council have executed a contract for the erection of a modern crematory plant, to be ready for operation in a few weeks. The Nye Odorless Crematory Company of Macon, Ga., will erect the incinerators on an acre lot at a cost approximating $7,500. Authority for the erection and operation of a city crematory plant was granted by the city council several months ago. The incinerators to be installed are of the latest type and are equipped for the burning of all refuse matter. The installation of a crematory plant is in line with the extensive sanitary improvements recommended by the past and present city physicians and the officials of the United States Public Health Service.

Refuse Collection Workmen Get Raise.

Columbus, O.—The city council has passed an ordinance providing that the salaries of the officers and employes in the division of garbage and refuse collection shall be as follows: Superintendent, $2,000 per year; inspector, $110 per month; clerk, $110 per month; dumpmen, each, $75 per month; stablemen, each $75 per month; watchmen, each $70 per month; drivers, each $2.75 per day; repairmen, each 40 cents per hour; laborers, each $2.50 per day; rubbish foreman, $110 per month. The rubbish plant will be operated by the division of garbage and refuse collection, and the salaries of the several employes for the operation of the plant, will be as follows: Foreman, $100 per month; firemen, $80 per month; laborers, $2.50 per day.

Use Prisoners For Street Cleaning.

Canton, O.—City prisoners are to be put at work cleaning the city streets, according to a statement by mayor Schrantz. Men who are charged with intoxication or other minor offenses will be given their choice by police judge Quinn of working on the street or going to the workhouse, according to Schrantz and service director Starrett. The prisoners will be sentenced to work from two days to a week cleaning the street or loading cinders on city trucks, it is stated. They will wear a uniform consisting of white overalls on which will be printed the words, "City of Canton." The uniform will distinguish them from the regular employees of the street department and also render the chance for escape less easy, it is stated. "The difficulty of getting men in the street department has compelled us to look for some other means of securing labor to keep the streets of the city clean," mayor Schrantz said. "Council will be asked, if necessary, to increase the fund for the maintenance of prisoners so that men working on the street can have at least one hot meal a day." Schrantz believes that the moral effect of public street work on many of the prisoners will work against their again violating the city laws. Police judge Quinn on

several occasions recommended putting repeated offenders at some occupation whereby the city would profit. A police officer will watch the men as they work under the supervision of street superintendent Preston.

Sidewalk Snow Removal Charged to Owners.

Minneapolis, Minn.—A recent order has been issued by city attorney C. D. Gould to the following effect: "We intend to begin an early campaign to keep sidewalks free from snow and ice. Damage suits aggregating $150,000 for injuries suffered by pedestrians on snow and ice covered sidewalks were filed last year. Property owners who do not clear their sidewalks of snow within 24 hours after a storm will receive notice. If they do not comply the city will clear the walks and charge the cost to the property. It will be as cheap to maintain a special municipal snow shovel brigade as to fight damage cases in court."

MISCELLANEOUS

Race Segregation Declared Unconstitutional.

Washington, D. C.—Compulsory separation of the negro and white races in residential districts is a violation of the constitution, the Supreme court has held in a unanimous opinion declaring invalid the Louisville, Ky., segregation ordinance. The measure, which prohibited persons of either race moving into blocks in which a majority of residents were of the opposite color, is similar to ordinances now in effect in St. Louis, Baltimore, Richmond, Lynchburg, Atlanta, and many other cities. Houston, Norfolk and other cites also have segregation ordinances.

Louisville, Ky.—The Supreme Court at Washington, in declaring unconstitutional the race segregation ordinance of this city, decided that such laws would not prevent the amalgamation of the races, as was claimed by the Louisville authorities, or prevent race conflicts. "Desirable as this is and important as is the preservation of the public peace," said the opinion, "this aim cannot be accomplished by laws or ordinances which deny rights created or protected by the federal constitution." Laws providing for the separation of races in public conveyances and in the public schools where equal privileges are given, the court pointed out, have been upheld, but it asserted that such legislation must have its limitations and cannot be sustained where the exercise of authority exceeds the restraints of the constitution. The court's action was a reversal of the lower court, which held the ordinance to be a reasonable exercise of the state police powers. The ordinance was enacted in 1914 and the case was argued twice in the Supreme Court. The court is quoted as saying: "The right which the ordinance annuls was a civil right of a white man to dispose of his property if he saw fit to do so to a person of color, and of a colored person to make such disposition to a white person."

Baltimore, Md.—Decision that the Louisville segregation ordinance is unconstitutional, which also applies to the West segregation ordinance now in effect in Baltimore, has resulted from a long fight in the courts. This fight began as soon as the present West ordinance was passed, in September, 1913, after the first ordinance offered by city councilman West had been declared void by judges Harlan and Duffy in the criminal court. Arrangements were at once made for the presentation of test cases, at which the validity of the law was to be examined, and the struggle has been going on virtually ever since. Argument before the Supreme Court of the United States in the Louisville race segregation ordinance began during the spring of 1916, by which time the matter had reached the highest tribunal in the land. The Maryland Court of Appeals, in an opinion handed down in August, 1913, upheld the right of the city to pass a race segregation ordinance, but declared the West ordinance invalid on technical grounds. This decision was followed a short time later by the passage of another ordinance, drawn up by Milton Dashiell, attorney, with the cooperation of city councilman West, and this ordinance, too, was fought from the moment it came out. Judge Stump in the Criminal Court on April 7, 1915, upheld the validity of the new ordinance in the case of a real estate agent charged with a violation under the law. The ordinance makes it a crime for any white to use as a residence or place of abode any house, building or structure in any colored block, and similar restrictions apply to the negro race. Any person violating the provisions is guilty of a misdemeanor and subject to a fine of not less than $5 nor more than $50. A term of not less than thirty days nor more than twelve months in jail may be imposed, at the discretion of the court. Each day the violation continues is considered a separate offense, and the owner or agent of a house is deemed equally guilty with persons occupying the house. No negro may move into a block in which more than half of the residents are white, or vice versa, and when a block is begun the builder must specify what race the houses are intended for. Keen disappointment was evinced by mayor Preston and city solicitor Field over the ruling of the United States Supreme Court in the segregation case. Commenting on the Louisville decision, city solicitor Field declared the Baltimore law much simpler than the Louisville law. The local statute, he said, makes provision for the establishment of "mixed blocks," providing quarters for both blacks and whites. The Louisville law does not do this. He also explained that the local law permits colored people to move into new territory, whereas this is prevented by the statute of Louisville. Charles Steffey, of Carter & Steffey, Inc., local real estate brokers, said that the ruling of the Supreme Court will have a demoralizing effect upon property values and will mean that property owners in white neighborhoods will have absolutely no protection against the invasion of negroes. "It means that white neighborhoods will not longer be reckoned as such, and that negroes will be free to live where they please, as they did before the last segregation ordinance was passed. The result will be that property values, which have been kept up by this restriction, will drop." When asked what the real estate brokers would do about the matter, Mr. Steffey said: "There is absolutely nothing we can do, so far as I can see. It will now be up to the property owners to see that their neighborhoods are kept free from negroes, as it only takes one property owner to ruin a block. Real estate dealers will do their part toward keeping white neighborhoods free from negroes."

War Economy Halts City Planning.

Salt Lake City, Utah.—Establishment of a zoning system in Salt Lake and the coordination of municipal building and parking enterprises according to a general plan met with opposition when the city commissioners went on record as opposing the expenditure of money on the contemplated plans in art and arrangement during the duration of the war. The need of conserving the financial resources of the city was expressed by mayor W. Mont Ferry and approved by other commissioners. The making of a survey and the sketching of a zoning plan by George E. Kessler, city planning expert, will be carried out, however, as previously provided for. The sum of $300, already voted by the commissioners at the instance of the civic art and planning commission, will be spent, but when it is exhausted a halt will probably be called.

Assail Coal Seizure by Ohio City Officials.

Washington, D. C.—The fuel administration recently issued the following: Wholesale coal robbery in Ohio has been unearthed by the United States fuel administration. In some places railroad tracks have been torn up, through freights stopped, and loaded coal cars confiscated. In other places cars of coal have been taken from sidings. The thefts have been directed by mayors and city officials of towns which have been allowed only enough coal for their immediate needs and where the people had become restive from seeing hundreds of coal trains go rattling through the state headed for lake ports and the northwest. This municipal robbery has not only disarranged shipping, but it has caused unnecessary hardships in other states and in other Ohio towns. An example of this was given by Homer H. Johnson, fuel administrator for Ohio. Four cars of coal were ordered to one town which needed fuel badly. The day it was scheduled to arrive trucks and wagons waited vainly at the station to unload the promised coal, a town just an hour's run down the line having stopped the train and confiscated all four cars for its own

use. Much confusion was the result, as a supply for the second town was was already on the road. Most of the coal stolen, however, was on its way to Minnesota, the peninsula of Michigan, northern Wisconsin, and the Dakotas. The fuel administration is rushing thousands of cars of coal to these states by way of the Great Lakes in order to provision them for the winter before ice shuts down lake traffic, usually between the 1st and 10th of December. It is an exciting game which the fuel administration is playing against time, as the coal which is not gotten into this territory by the lakes can not be sent in any other way, because the shortage of coal cars is so great that none can possibly be spared for the long haul to the northwest. The fears of the offending Ohio towns, that they would be left entirely without coal, were groundless, as the fuel administration has ordered that the immediate needs of Ohio and Michigan be supplied.

Willoughby, O.—Coal seizures in times of urgent need went under the ban when the federal grand jury at Cleveland reported indictments against mayor Carmichael, of Willoughby, prosecuting attorney George C. Von Besseler and marshal James Barnes and Grant Lamos, deputy, for impeding interstate commerce shipments and for conspiracy to commit such acts. All are charged with seizing New York Central railroad coal November 1 and 2. Action by the jury follows the announcement of a few weeks ago by district attorney Wertz that city and county officials have no right to confiscate coal and that the law which forbids such confiscation must be obeyed. Several freight trains were held up at Willoughby November 2, the indictments charge, and engineers and conductors were arrested. Mayor Carmichael, it is stated, was told that he had a right to confiscate coal by prosecutor von Besseler, who was quoted as saying that the law of humanity is greater than that of the government. Assistant district attorney Kavanagh says his advice and the action which apparently followed constitute the conspiracy with which the village officials are charged. The mayor, prosecuting attorney and deputy marshals would face, if convicted of conspiracy, penalties of $10,000 fine, two years' imprisonment, or both. If convicted of holding up the trains, with which another set of indictments charges them, they would be liable to fines of $100 and six months' imprisonment, or both.

Work for Zoning in San Francisco.

San Francisco, Cal.—In conjunction with other associations, the Civic League of Improvement Clubs and Associations is making decided progress towards realizing the creation of the long-desired City Planning Commission, as contemplated by the citizens when they adopted a charter amendment a few years ago for that purpose. This proposition is now before the board of supervisors and is receiving the particular attention of the Civic League planning committee, of which T. P. Robinson of the Point Lobos Improvement Club is chairman. The proposed ordinance now before the supervisors contemplates the creation of a city planning commission, which shall carry into effect a zone system for San Francisco in accordance with the laws adopted at the recent session of the state legislature empowering cities to establish zones to which mercantile and manufacturing establishments, garages, laundries and stables shall be confined. This zone system would also permit the establishment of "set-back" lines in residence districts by ordinance. In this connection the harbor improvement committee, Edgar Painter of the North Central Improvement Association, chairman, has been active in the creation of spur-track zones in the manufactuding districts of the city. This committee has proposed the widening of many of the streets in this district by reducing the width of sidewalks from twelve to eighteen feet to six or eight feet, for the reason that the pedestrian traffic is very slight on these streets. This committee has worked to secure many of the spur tracks now connecting with the State belt railway, to the financial advantage of the state of California. Regarding the establishment of passenger transportation along the water front, the fact that the Municipal Railways have found bus transportation very unprofitable during the recent strikes raises the doubt of its establishment along the Embarcadero, as promised to the harbor commissioners when the latter have completed the smooth strip of pavement.

LEGAL NOTES

A Summary and Notes of Recent Decisions—Rulings of Interest to Municipalities

Access to Property—Interference.

(Minn.) Where an owner's access to his property would not be interfered with by vacation of a street for depot purposes, and he would suffer no special injury, he could not maintain an action to enjoin vacation.—Thorpe v. City of Ada, 162 N. W. 886.

Encroaching in Street—Nuisance.

(N. J. Ch.) Columns or pilasters supporting the upper stories of a building and encroaching on street 22 inches constituted a public nuisance.—Van Marter v. First Nat. Bank, 100 A. 892.

Public Improvement Contract—Lowest Bidder.

(N. D.) Clauses of proposed contract for public improvement giving city engineer power to insure completion of work in conformity to plans did not violate Comp. Laws 1913, § 3708, requiring letting of such contract to lowest bidder.—Will v. City of Bismarck, 163 N. W. 550.

Waiving Notice of Special Meeting.

(N. M.) Notice of a special meeting of a city council or board of trustees of a town may be dispensed with, or waived, by the presence of every one of those entitled to notice.—Schwartz v. Town of Gallup, 165 P. 345.

Error in Notices—Republication.

(Cal. App.) Although street improvement notices did not refer to the proper official city map, the error was made harmless by a correct republication.—Thomas v. City of Petaluma, 165 P. 1021.

Right to Construct Local Sewers.

(Mo. App.) Under Rev. St. 1909, §§ 9384—9392, city of fourth class may establish sewer district, and construct sewers therein, at cost of district, emptying into river, natural course of drainage, without first establishing sewer system for whole city.—Sasse v. Barkwell, 195 S. W. 542.

Payments Without Warrants—Liability.

(Wash.) Where, by his illegal act in paying out money of city of third class in cash without warrant, city treasurer created shortage in his official fund, and illegally paid out city's money, to recover from him, city need not show, also, manner of misappropriation.—City of Hillyard v. Carabin, 165 P. 381.

Enforcing Observance of Ordinance.

(Ky.) Under Ky. St. § 3499, part of charter of cities of fourth class, mayor of city of fourth class could not direct city attorney to bring suit to enforce observance of an ordinance, unless authorized by city council to do so.—Galanty & Alper v. City of Maysville, 196 S. W. 169.

Estimating and Contracting for Sewer Construction.

(Mo. App.) Person designated by ordinance is proper officer to make estimate of cost of sewer, under Rev. St. 1909, § 9407, before city, having no engineer, can contract for its construction.—Sasse v. Barkwell, 195 S. W. 542.

Recording Ordinance—Validity.

(N. M.) Statute requiring town ordinance to be recorded in ordinance book was complied with by copying ordinance on typewriter and pasting sheet in ordinance book so as to become a permanent record.—Schwartz v. Town of Callup, 165 P. 345.

NEWS OF THE SOCIETIES

Calendar of Meetings.

Nov. 19-23.—AMERICAN PRISON ASSOCIATION. Annual Prison Congress, New Orleans, La. Secretary, Joseph P. Byers, 702 Empire Building, Philadelphia, Pa.

Nov. 19-24.—CITY MANAGERS' ASSOCIATION. Annual meeting, Detroit, Mich. Secretary, W. L. Miller, City Manager, St. Augustine, Fla.

Nov. 20-23.—PLAYGROUND AND RECREATION ASSOCIATION OF AMERICA. Recreation Congress. Secretary, H. S. Braucher, 1 Madison Ave., New York, N. Y.

Nov. 21-24.—NATIONAL MUNICIPAL LEAGUE. Twenty-third annual meeting, Hotel Statler, Detroit, Mich. Secretary, Clinton Rogers Woodruff, 703 North American Bldg., Philadelphia, Pa.

Nov. 25-Dec. 1.—ATLANTIC DEEPER WATERWAYS ASSOCIATION. Annual convention, Miami, Fla. Secretary, W. H. Schoff, Crozer Building, Philadelphia, Pa.

Dec. 6, 7.—ILLINOIS MUNICIPAL LEAGUE. Annual convention, University of Illinois, Champaign and Urbana, Ill. Secretary, John A. Fairlie.

Dec. 4-6.—AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS. Annual meeting, Richmond, Va. Acting secretary, H. M. Berry, Chapel Hill, N. C.

Dec. 26-29.—AMERICAN POLITICAL SCIENCE ASSOCIATION. Annual meeting, Philadelphia, Pa. Secretary, Clinton J. Swartz, Trenton, N. J.

Dec. 27-29.—AMERICAN SOCIOLOGICAL SOCIETY. Annual meeting, Philadelphia, Pa. Secretary, Scott E. W. Bedford University of Chicago, Chicago, Ill.

Jan. 3, 4.—NEW JERSEY STATE LEAGUE OF MUNICIPALITIES. Annual convention, Trenton, N. J. Secretary, Clinton A. Swartz, Trenton, N. J

Jan. 15-17.—VIRGINIA GOOD ROADS ASSOCIATION. Seventh annual convention, Richmond, Va. Secretary, C. B. Scott, Richmond, Va.

Feb. 6-13.—FIRST CHICAGO CEMENT MACHINERY AND BUILDING SHOW. Supersedes annual Chicago Cement Show. Held at the Coliseum, under direction of the National Exhibition Co.

March 17-24.—PAN-AMERICAN CONGRESS ON CHILD WELFARE. Montevideo, Uruguay. Secretary, Edward N. Clopper, 105 East 22d Street, New York, N. Y.

New England Water Works Association.

The committee appointed by the president of the association have nominated the following officers:

President, Carleton E. Davis, chief, bureau of water, Philadelphia, Pa.; vice-presidents, Samuel E. Killam, superintendent pipe lines and reservoirs, Metropolitan water works, Boston, Mass.; Henry V. Macksey, superintendent of public works, Woburn, Mass.; Frank A. Barbour, consulting hydraulic and sanitary engineer, Boston, Mass.; Percy R. Sanders, superintendent of water works, Concord, N. H.; Thomas McKenzie, superintendent water works, Westerly, R. I.; Henry R. Buck, consulting engineer, Hartford, Conn.

Additional members of executive committee: Frank J. Gifford, superintendent water works, Dedham, Mass.; A. R. Hathaway, water registrar, Springfield, Mass.; H. T. Sparks, superintendent water works, Brewer, Me.

Secretary, Willard Kent, civil engineer, Narragansett Pier, R. I.; editor, Henry A. Symonds, hydraulic engineer, Boston, Mass.; treasurer, Lewis M. Bancroft, superintendent water works, Reading, Mass.; advertising agent, Henry A. Symonds, hydraulic engineer, Boston, Mass.; finance committee, Geo. A. Carpenter, city engineer, Pawtucket, R. I.; Edwin L. Pride, public accountant, Boston, Mass.; Bertram Brewer, superintendent sewers and water works, Waltham, Mass.

The November meeting of the New England Water Works Association was held Wednesday, November 14, at the Boston City Club, Boston, Mass. In addition to an interesting program, the Dexter Brackett Memorial Medal for the year 1916 was presented by Mr. Desmond Fitzgerald, chairman of the Committee of Award. The papers presented follow: "Water Works Shop Construction" (with illustrations), by A. E. Martin, Euperintendent of the Springfield, Mass., water works, and "Construction of Earth Dam on Phelps Brook" (Hartford's water works system), by J. H. Shaunessy, assistant engineer. The program opened with a meeting of the Executive Committee, and at noon a lunch was served at the Boston City Club.

Ohio Valley Improvement Association.

A resolution was adopted by the Ohio Valley Improvement Association, at its twenty-third annual convention, held at Evansville, Ind., Oct. 25, urging that the congress place the improvement work along the Ohio river on the continuing contract basis, or adopt some other method which will give assurance of the certain and speedy completion of the improvements, so that capital will locate industries along the river, barge lines will be built, and municipalities and private concerns will feel justified in planning and arranging for proper terminal facilities.

Another resolution urging radical changes in the interstate commerce law to give the interstate commerce commission power to fix water transportation rates and to fix a differential for water transportation to cover its inherent disadvantages over rail transportation, was held up by the resolutions committee, it being decided not to push it until the next annual convention. This resolution urged that the law of 1912 be amended to give the commission power to regulate rates, to set a minimum as well as a maximum rate, and to fix the differential.

John H. Rohzenberger, field secretary of the national rivers and harbors congress, was a speaker. He was followed by George K. Denton, of Evansville, representative in the congress from the First Indiana district. Mr. Denton said most of the opposition to river improvements in the congress came from men who believed the rivers are not used enough, and that money spent on them is thrown away.

The convention adjourned shortly before noon. Louisville was selected over Marietta, O., as the place for holding the 1918 meeting. John L. Vance, of Columbus, O., who has been president of the association since its organization, was re-elected president to serve for life. W. C. Kulkins, of Cincinnati, was re-elected secretary, and George Puchta, mayor of Cincinnati, was re-elected treasurer. The following were elected vice-presidents from Indiana: Benjamin Bosse, mayor; Howard Roosa and John H. Rohzenberger, of Evansville; C. C. Wymond and Joseph M. Cravens, of Madison, and E. T. Slider, of New Albany.

Pennsylvania Housing and Town Planning Commission.

The state housing and town planning commission will hold its 1918 convention in Johnstown the latter part of May or the early part of June.

Massachusetts Police Association.

At the annual meeting of this association held at Taunton, Oct. 17 and 18, deputy chief James Cash of Taunton was elected president of the association and others officers elected were as follows:

Deputy chief Thomas McMurray of Worcester, vice-president; Capt. Jas. M. Keaney of Cambridge, secretary; Charles W. Allen of Somerville, treasurer; James E. Maher of Malden, sergeant-at-arms; chief William F. Dinneen of North Adams, Michael McDermitt of Fall River, John H. Shaughnessy of Newton, Benjamin F. Wright of Lynn, Edwin C. Holbrook of Springfield, James A. Philbrick of the Metropolitan park police, Edward F. Flanagan of Lowell, Albert R. White of New Bedford, William J. Armitage of Wellesley, executive committee.

The legislative committee includes Capt. Henry T. Ryan of Haverhill, Michael A. Barry of Lawrence, John W. Roberts of Cambridge, William E. Hackett of Fitchburg, Fred A. Wentworth of Everett, William B. O'Connor of Chelsea, George S. Randall of the Metropolitan Park police, Michael F. Sheehan of Worcester, Michael J. O'Brien of Springfield, Joseph A. Sanders of New Bedford, Bernard H. Flaherty of Fitchburg.

California Association of County Assessors.

The annual convention of the association was held at Redding, Oct. 8 and 9. The feature of the program of the first day was an address by state controller John S. Chambers on the "Menace to State Revenues Because of Federal Encroachments."

Encroachments on state sources of revenue by the federal government, asserted state controller Chambers, not only have been proceeding a much

(Continued on page 527.)

INDUSTRIAL NEWS

Cast Iron Pipe. Owing to unforeseen price conditions in the south and new differentials, prices have been raised $5 at Birmingham and Chicago. The New York prices, however, remain unchanged. Municipal business is still being withheld to a large extent because of prices: Quotations: Chicago, 4-inch, class B and heavier, $58.50; 6-inch, $55.50. New York, 4-inch, class B and heavier, $59.50; 6-inch, $56.50. Birmingham, 4-inch, class B and heavier, $53; 6-inch, $50; class A, $1 extra, all sizes.

The American-La France Fire Engine Co., Elmira, N. Y., recently delivered the following fire apparatus to the cities named: West New York, N. J., 2 type 45 combinations; Florida, N. Y., type 40 comb. with Junior pump; Burlington, Iowa, type B 4-cyl. combination; Lexington, Mass., type 14 city service truck; Three Rivers, Mass., Brockway combination; Covington, Ky., 2 type 45 triple combinations; Sherrill, N. Y., Brockway combination; So. Bethlehem, Pa., 2 type D 6-cyl. Brockway combination; St. Marys, Pa., type 40 comb. with Junior pump; Butler, Pa., type 12 pumper; Philadelphia, Pa., type 31 85-ft. aerial truck; Salina City, Cal., type 12 combination; Philadelphia, Pa., type 45 combination; Marcus Hook, Pa., combination with Junior pump; Reno, Nev., type 17 85-ft. aerial truck; Topeka, Kans., type 40 comb.; Rockland, Me., type 12 triple; Laramie, Wyo., type 40 comb. with Junior pump; Ann Arbor, Mich., type 12 pumping engine and hose car; Stevens Point., Wis., type 40 comb. with Junior pump; Asbury Park, N. J., type 14 comb. service truck; Nevada City, Cal., Brockway type B combination; Titusville, Pa., type 40 comb. with Junior pump; Summer, Wyo., Brockway type D combination; Reno, Nev., type 45 pumping engine and hose car, type 12 chemical engine and hose car; Shaker Heights, Ohio, type 12 triple; Provo City, Utah, type 12 triple comb. chemical engine and hose car.

English Demand for Commercial Vehicles.—According to consular reports, it is probable that after the war there will be a favorable opportunity in England for the sale of electrically propelled vehicles. American manufacturers would do well to look to this field and be prepared when normal times return to get a fair share of the trade. In the past this type of car failed to obtain much popularity, but the scarcity and high price of gasoline and the difficulty of obtaining any of the ordinary liquid fuels have caused a change. Many persons are convinced that the price of gasoline will remain high even after hostilities cease, and in fact may never again be as low as in pre-war times. It is true that coal gas as a substitute for gasoline has been largely employed by many motorists, but for various reasons, especially on account of the space that it occupies, only a small proportion have adopted it as a way out of the gasoline difficulty. Already the use of electric commercial cars has begun to show an increase, although they are difficult to obtain under present conditions. When the war is over it is thought that there will be a large demand for the electric car. Several municipalities have been experimenting with heavy electric vehicles and obtained satisfactory results. They have been found to be especially suitable for such work as town scavenging. A heavy car which runs between the towns of Smethwick, Dudley and Kidderminster near Birmingham is supplied with electrical energy at a low cost. Birmingham is well situated from an electric-vehicle point of view. Not only is current cheap, but within a 50-mile radius of the city there are 22 charging stations, apart from the 7 stations within the city.

Contractors and Builders Show.—According to reports by the management of the National Exhibition Company, which is promoting the Contractors and Builders Show, to be held February 6-13, 1918, at the Coliseum, Chicago, the name Contractors and Builders Show has been enthusiastically accepted by all interests. This event is expected to be an open forum for the display of machinery, equipment, and building materials of all kinds for the construction of offices, factories, warehouses, power plants, etc.; for homes of cement, lumber, brick and tile; for roads of concrete, brick, asphalt and block. An exhibit of this character is calculated to greatly increase the interest of the contractor and builder, and every effort will be made not only to secure their attendance, but also that of dealers in building materials from all sections of the country. Throwing the show open to other lines has not lessened the interest of the cement industries, who have assured the management that they will do everything possible to make their end of the show a great successs. The Portland Cement Association will use a generous amount of space for making a complete working exhibit, more interesting than anything shown in past years. George M. Spangler, Jr., manager of the convention bureau of the Chicago Association of Commerce, advises that the following conventions are booked for the week of the show: American Association of Engineers; American Concrete Institute; American Concrete Pipe Association; Central Association of Lumber, Sash and Door Salesmen; Illinois Lumber and Builders' Supply Dealers' Association; National Association of Sand and Gravel Producers; National Builders' Supply Association. In addition, the management is working on several other associations and hopes to make definite announcement at an early date.

Efficiency and Economy in Shipping Freight. The Pennsylvania railroad has completed the revision of its method of handling less-than-carload freight, at all stations on its lines in northern New Jersey. On November 19, the "shipping day" or "sailing date" plan, which has been already established in New York, Philadelphia, Buffalo and Baltimore was inaugurated at Trenton, Phillipsburg, Easton, Bristol, New Brunswick and other stations on the New York and New Jersey divisions. The custom of accepting freight in less-than-carload lots indiscriminately, at all stations, or at any time of the day, for shipment to any point, is now discontinued. Under the new plan freight destined for various points is accepted only at specified stations and on designated days. Furthermore, closing hours are established at the various stations, ranging from 3 o'clock to 5 o'clock P. M., after which freight will not be accepted for shipment. The purpose of the "shipping day" or "sailing date" plan is to eliminate, as far as possible, the rehandling of freight at transfer stations, and, whenever practicable, to consolidate less-than-carload freight into full carloads at the point of origin. This will reduce the time that freight is in transit. It will increase the number of cars available for both commercial freight and government supplies, enlarge the capacity of the whole railroad plant, release trackage and locomotives for troop movements and greatly lessen the liability of loss and damage to merchandise by eliminating rehandling after the car is once loaded.

NEWS OF THE SOCIETIES

(Continued from page 526)

longer time than realized by fiscal officials of the states, but in recent years, and particularly since the war began, have been growing stronger and stronger—so strong, in fact, that the situation is now acute and calls for earnest consideration and prompt action.

Chambers said that present abnormal conditions presented no reason for postponing the taking up with the federal government of the question of its encroachments.

The states should protest against the trespass and demand an understanding with the federal government on the sources of revenue left to the one and to the other.

Unless the states protest now, said the controller, congress might permanently retain the money it is drawing from the state, to the very serious disarrangement of its finances.

Chambers estimates that the government is taking from California, on the basis of the collections by the state of California, between $3,500,000 and $4,000,000 a year. The state revenue from this particular source is of a like amount, thus making a grand total tax upon inheritances of about $8,000,000 in a state of not over 3,000,000.

If the federal government persists in its policy, there will be little left for the states to fall back upon but the taxation of general property, and even here they are not safe from assault by the federal government.

As indicating California's situation under such circumstances, the Controller stated that the grand total of the assessment rolls of the counties for 1917 is $3,723,113,539. On the theory that this sum represents 42 per cent. of the real value, then the real value would be $8,864,556,046, exclusive of exempt property. The actual value of property owned by the state government itself as shown by a recent inventory, is almost $70,000,000.

Chambers reviewed the plans for a national conference between state and federal representatives on the subject of taxation, which probably will be held in Atlanta in November. He declared the war was no excuse for the federal government encroaching upon fields of taxation belonging peculiarly to the states, and warned against the danger of these taxes being retained by the federal government after the war.

Others on the program for the day were: Ed J. Kay, of Sacramento, "Our Organization"; Herbert W. Clark, of the Taxpayers' Association of California, "Comparisons"; assessor John Ginty, of San Francisco, "Annual Meetings," and Will H. Fisher, of the Taxpayers' Association, on "Observations."

During his talk county assessor Ed J. Kay, of Sacramento, read a paper on "Our Organization."

He praised the services of state controller John S. Chambers, Richard Collins, president of the state board of equalization; John Mitchell, John C. Corbett and Jeff McElvane, members, and Edwin Rolkin, former member of the board.

"The duties of auditors, tax collectors, treasurers and assessors are so closely interwoven," said Kay, "that a closer relationship should be had."

As a means to that end he advocated a joint convention of these four classes of county officials in the near future.

PERSONALS

Lavery, John J., formerly city engineer of White Plains, N. Y., has been appointed city engineer for Summit, New Jersey.

Lehman, Karl B., of Wilkes-Barre, has been appointed by Governor Brumbaugh of Pennsylvania planning engineer of the Bureau of Municipalities of the State Department of Labor and Industry. He will assist the smaller municipalities, principally boroughs, in their planning work. The position, a new one, pays $3,000 a year.

Macartney, Morton, city engineer of Spokane, Wash., has resigned to become associated with Porter Bros., contractors. Mr. Macartney will be succeeded by Alfred D. Butler, who has been assistant city engineer for the past nine years.

Marcellus, J. B., recently division engineer, Portland Cement Association, Kansas City, Mo., has been appointed state drainage and irrigation engineer of Kansas. Mr. Marcellus is a graduate of Kansas State University Engineering School, and has had 15 years' practical engineering experience, including drainage and irrigation in the west and northwest. His office is at Manhattan, in connection with the extension division of the State Agricultural College.

Valentine, Robert F., has been appointed park commissioner of Manhattan and Richmond boroughs, New York City. He succeeds Cabot Ward, now a major in the national service.

Schmittberger, Max F., chief inspector of the Police Department of New York City, died October 30, aged 67 years. He had been a member of the Police Department for forty-three years.

The following mayors have been elected in Indiana cities:

Alexandria—R. H. Malone.
Anderson—Jesse Hick Hellett.
Angola—E. M. Hetzler.
Attica—Jesse Martin.
Auburn—Eli C. Walker.
Aurora—Daniel Teaney.
Batesville—Charles W. Gibson.
Bedford—Charles H. Allen.
Bicknell—Logan Winter.
Bloomington—Will Weaver.
Bluffton—Perry F. Hunt.
Boonville—Edgar Jarrett.
Brazil—John J. Jones.
Butler—George L. Rowe.
Cannelton—Zimmermann.
Clinton—Edward Lowery.
Columbia City—John W. Baker.
Columbus—Frank S. Jones.
Connersville—Charles Reider.
Covington—W. R. Massey.
Crawfordsville—Dumont Kennedy.
Crown Point—Lee F. Hayes.
Decatur—Charles W. Yoger.
Delphi—Dr. Frank Robinson.
East Chicago—Leo McCormack.
Elkhart—W. H. Foster.
Elwood—John Lewis.
Evansville—Benjamin Bosse.
Frankfort—Dr. Oscar W. Edmonds.
Franklin—John N. Graham.
Wayne—W. Sherman Cutshall.
Garrett—Dr. T. A. Clevenger.
Gary—William F. Hodges.
Gas City—Frank Leminaux.
Greencastle—E. Rupert Bartley.
Greensburg—Dr. Cassius C. McCoy.
Greenfield—Ora Myers.
Goshen—Daniel J. Troyer.
Hammond—Dan Brown.
Hartford City—Henry McAlee.
Huntington—Charles N. McGrew.
Huntingburg—August H. Koerner.
Jasonville—John Brent.

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

A number of STREET IMPROVEMENTS are to be made by Thomasville, Ga. The city's consulting engineer is O. H. Lang.

Improvements to its WATERWORKS are to be made by Sterling, Colo. A. A. Weiland has been retained to prepare plans and specifications.

Swissvale, Pa., is making PAVING IMPROVEMENTS following plans and specifications prepared by the firm of Freas & Sperling.

Bossier City, La., is to install new machinery at its WATERWORKS. Plans and specifications for the improvement were made by the engineering firm of Honaker & Swope.

Lamberton, Minn., is to construct a SEWER SYSTEM, the plans and specifications for which are to be prepared by the firm of A. L. & E. W. Goldenstar.

Bradley, Ill., is to build a SEWERAGE SYSTEM to cost about $175,000. Contracts for the work will soon be let, plans and specifications being completed by the engineers, Marr-Green Company.

A rapid sand FILTRATION PLANT is to be installed to improve the taste of the water supplied by the city of Whiting, Ind. The improvement follows the recommendation and plans of the consulting engineering firm of Pearse & Greeley.

A BRIDGE, to be built by Cohoes, N. Y., was planned by W. Marden.

A SEWER SYSTEM is to be built by Mankato, Minn. J. H. A. Brahtz has been retained as engineer to prepare plans and specifications.

SEWERS to be constructed by the village of Melrose, Minn., have been planned by the engineering firm of Chute & Bradley.

A storm SEWER SYSTEM, to cost about $60,000, is to be constructed by Winnebago, Minn. Plans for the improvement are in progress in the hands of the engineer, C. H. Currie.

Trunk SEWERS and a SEWAGE DISPOSAL PLANT are to be built by Ellwood City, Pa. Plans are in process of preparation by the engineer, R. Winthrop Pratt.

East Lynn, Conn., and New London county are constructing a HIGHWAY BRIDGE. The consulting engineers for the improvement are Yates & Yates.

The commonwealth of Massachusetts, Norfolk and Plymouth counties, the Bay State Street Railway Company, and the town of Braintree are jointly to construct a BRIDGE. The local engineering firm of Hartley & White is to be assisted by the consulting engineers, J. R. Worcester & Company, in the preparation of plans.

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SEWERAGE SYSTEM FOR A SMALL TOWN.

Screen, Septic Tank, Coke Filter, Settling Tank and Chlorine Treatment—Pumping from a Low District—Mixing and Distributing Concrete at Plant—Trench Excavation by Machinery.

Some difficulties were encountered in designing and constructing a sewerage system and disposal plant for a section known as Prospect Beach, near West Haven, Conn. The section to be sewered is a long narrow strip facing on Long Island sound, mostly lying on a steep sidehill, but partly built along the flat land along the shore. This lower part is only slightly above the sea level and is either made ground, marshy land or gravel beach. The beach is wide and much frequented by residents of New Haven, especially during the summer. It was mainly to prevent the pollution of this beach that the construction of the sewerage system was begun.

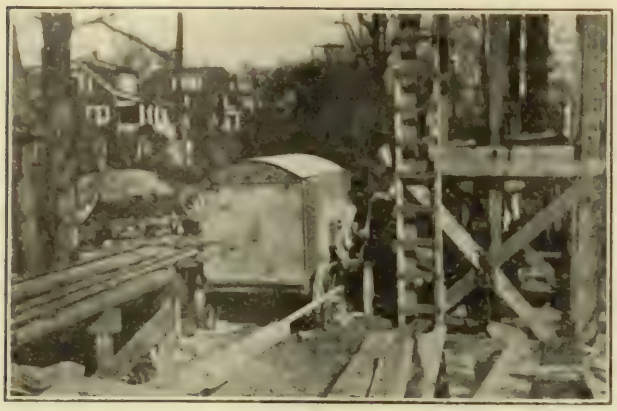
The design, in general, calls for a collecting system of about 30,000 feet of 8-inch, 10-inch and 15-inch sewers and a small treatment plant. The separate system was chosen because of the great savings in cost; also in this case storm drains can be constructed easily, with a few manholes, in pipe lines to carry storm water directly down the main streets into the sound. Treatment is to be by septic tank and coke filters, the effluent to be discharged into the sound at a point 600 feet from shore and in at least 6 feet of water, after sterilizing with chlorine. The treatment plant is located in a small salt marsh about 75 feet from the waters of the sound.

In designing the sewers it was estimated that six people would finally occupy each 50-foot lot, and the size of sewer required was taken as that necessary to carry 60 gallons per capita from 24 people per 100 feet. Infiltration was estimated at 100 per cent. With the minimum grade that would give a velocity of 2 feet per second and assuming a contributing population of 6,000, a 15-inch sewer running half full was necessary. All smaller sewers were designed on the same basis of 24 people per 100 feet, 60 gallons per capita, and 100 per cent infiltration.

The septic tank and coke filters were selected in preference to an Imhoff tank as a means of treatment, owing, in part, to conditions at the point chosen for the location of the plant. The less depth required for the septic tank was an important consideration, where excavation would be below the level of the sound; also it is possible to operate the septic tank covered, which the engineers assumed to be not the case with the Imhoff tank. As located, the plant is within a short distance of a main street (Ocean avenue), is very close to the bathing beach, and is within sight of many of the cotttages. When construction is completed, the swamp will be filled in, the beach improved and Ocean avenue straightened. With these improvements, it is expected that property values in the neighborhood will increase rather than decline.

DIGESTION TANKS IN FOREGROUND. AT RIGHT, REAR, FILTER AND SETTLING TANK.

Sewage, collected by the laterals, is taken through a 15-inch main to the treatment plant. The sewage passes through a screen chamber 8 ft. long and 3 ft. wide, and a screen with bars placed 3 inches apart, and then enters the digestion tanks. There are two of these. The larger is 16 feet wide and 21 feet 6 inches long; the smaller is the same length, but varies in width from 8 feet to 12 feet 6 inches. After treatment in the digestion tank the sewage passes over a weir at the end and is carried to the coke filters and settling tank. This tank is 20 feet wide, 60 feet long and about 5 feet deep. It is divided by a wall running lengthwise through the center. In each half is a coke filter 4 feet wide, and extending the full 60 feet, the walls of this filter being made up of perforated



CONCRETE MIXER, INDUSTRIAL TRACK AND AGGREGATE PILE.
Foot of tower at right.

brick, thus leaving a narrow settling basin in each half of the tank. The effluent from the digestion tanks passes through the coke filters and the perforated walls and into the settling basins. From the settling basins, the flow is over a weir and through a 15-inch discharge pipe to the chlorine treatment house. After sterilization, the effluent is discharged into the sound, as already described.

A small section of the region sewered is very low and the sewage from it will not flow to the treatment plant by gravity. A small pump house and collecting well will be constructed in this section and the sewage will be pumped through about 1,000 feet of 6-inch cast-iron force main to the treatment plant. The pumps will be electrically driven. Two screens will protect the pumps, both of which will have ⅜-inch bars, on the first one spaced 1 inch apart and on the one nearest the pumps spaced ⅜ inch apart.

The method of construction of the pipe line leading from the chlorine house into the sound has not yet been decided upon. The line is to be built of 15-inch Wyckoff creosoted wood stave pipe and will discharge 600 feet from the shore in 6 feet of water. Owing to the porous sand and mud bottom of the sound, coffer-dam construction is unlikely and the pipe will probably be put together on shore, floated to place and sunk in a dredged channel.

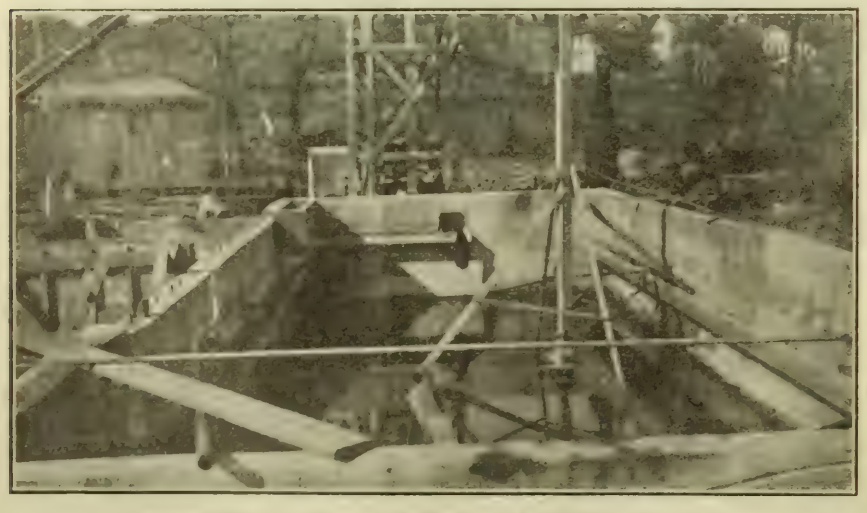
Excavation for the septic tanks, the chlorine house and the pumping station was done entirely by hand. Practically no sheeting was required except in the inlet end of the digestion chambers, where excavation was carried down nearly 15 feet. Here 2-inch planks, hand-driven, were used. Water was quite troublesome. Worthington reciprocating steam pumps were used chiefly for keeping the excavations clear, and were also used, along with hand pumps, for dewatering the trenches.

Concrete was distributed from a 65-foot tower by a chute to a platform, from which it was shoveled into the forms. The layout at the mixer was economical. A platform built above the level of the ground at the mixer, as shown in the illustration, enabled the mixer to be charged easily. Sand and gravel were brought from nearby piles and dumped from the barrows directly into the drum. Cement was stored in a shed about 50 feet from the mixer and transported to it, a dozen bags at a time, by an industrial car. The mix is 1:2:4. A 7-cubic foot gasoline driven mixer is used.

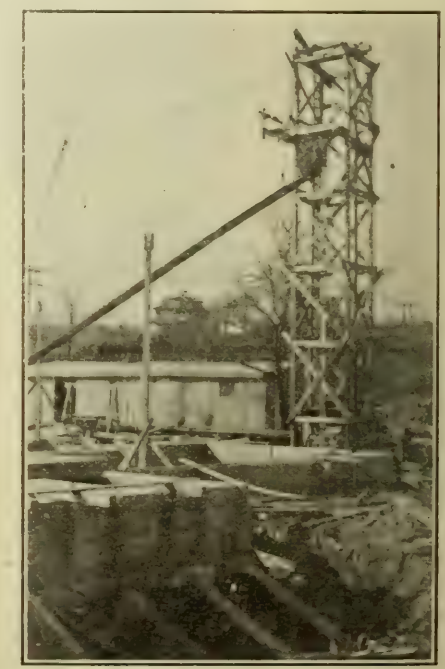
Many different conditions were encountered in trenching and in laying the pipe. Excavation in the whole job averaged about 7 feet in depth and in the deepest part reached 13 feet. On the hillside facing the sound, excavation was fairly easy, very little water was encountered and little sheeting required, planks being placed upright with braces between about every 3 to 5 feet. Along the shore the excavation reached its maximum depth and pumps had to be operated almost continuously. Part of the excavation was in firm gravel, which stood up quite well, part in made ground and part in marsh land. That in the made land was perhaps most troublesome, owing to the presence of frequent large boulders. All banks stood up well, and planks 3 feet apart, braced, furnished all necessary support. In the lower sections water was troublesome but was kept down by steam and hand pumps.

All excavation was done by machinery, except a very small section dug by hand at the beginning of the job. Two machines were employed and these worked very well, considering the varying conditions under which they were employed. No comparison of their work was possible, nor were the daily averages of the same machines comparable, for the same reason. No costs were kept, the machines being rented for this job.

The pipe laying gang followed closely the trenching machines. After laying, the pipe was covered about a foot and the joints left to set. The final backfilling was by hand or by horses and scraper. Manholes were cast integral from concrete, steel forms being used both inside and out.



SETTLING TANK: DIGESTING CHAMBERS AT LEFT.
Coke filters will be constructed in this tank. Concrete mixer and tower in rear.



CONCRETING TOWER AND DISTRIBUTING CHUTE.

Sand and gravel for constructing the treatment plant were secured by screening the deposits along the beach. Edison cement was used and pipe from St. Mary's, Pa. The Acme Engineering Co. of Hartford was the contractor, with M. E. Pierson, vice-president, in charge. Palmer & Lynch of West Haven were engineers in charge of design and construction. L. W. Snyder was inspector for the city of West Haven, under F. L. Coe, city engineer.

TRENCH THIRTEEN FEET DEEP.
Only small amount of sheeting required.

BUILDING ROADS IN THE EVERGLADES

Physical and Zoological Conditions Encountered—Locating Old Section Line Corners—Local Clayey Materials for Surfacing.

By SELDEN L. STEWART.*

Doubtless many readers remember seeing in their old geography text-books pictures of the Florida Everglades, showing giant trees covered with Spanish moss, large ferns, palms and luxuriant vegetation. This may have represented scenes in the vicinity of the 'Glades, but was a very misleading picture of the real Everglades of Florida. The Everglades are really one great big swamp covered with saw-grass. Saw-grass has a giant toothed blade and ranges from 3 ft. to 15 ft. high. Another common plant is the wampee, which has a very hot, pungent root, with a taste similar to that of the Indian turnip or Jack-in-the-pulpit. Other features much in evidence are the alligator ponds, with accompanying 'gator slides and caves, in which ponds are to be found arrow leaf and other aquatic plants. But as far as the eye can reach, and then on and on beyond, it is one great sea of saw-grass.

Under foot there is nothing but muck, which is generally covered with water 2 or 3 ft. deep in the rainy season of the summer months, but in winter is often almost dry. In the winter of 1916-17 the rainfall was so slight that parts of the 'Glades, in which the soil approximates peat, took fire and great areas of this soil were burned off. At night the display of fire was very beautiful and during the day great clouds of whitish smoke rolled up.

Moccasins, alligators and otters are the most common creeping animals, and gallinules, mud-hens and other "squawks" nest and feed in the big swamp.

A road is being built across the state from east to west, which necessarily crosses the Everglades. In running the line for the division known as Special Road and Bridge District No. 2, the survey was commenced at a point in the Ft. Myers road, 12 miles west of Labelle. The line parallels the Caloosahatchee river for 20 miles, then bears off southeast to a township line, then due east along the south boundary of another township, then northeast across a third township to Lake Okeechobee, and around the south shore to the intersection of the Lee and Palm Beach county lines, a total distance of about 49 miles.

At the eastern end of this division, for 33 miles, the highway right-of-way is across virgin country, with not a single dwelling in sight. Cattle and hogs range over this region, the cattle being to some extent confined by wire fences. While at work, the engineers frequently flushed wild turkeys and deer; and quail and fox squirrels and smaller game were too common to be interesting. In the preliminary work it was necessary to run over and relocate old section lines surveyed by government surveyors back in 1872, and there was only one corner that could not be found. The old fat "lighter" stakes (stakes cut from heart pine) were still standing just as driven, and in most cases the Roman numerals which designated the four cornering sections could be read plainly. These numerals had been cut in the wood with an old fashioned marker. The one corner that could not be picked up was in a bonnet pond in the middle of a saw-grass pond. The water in the bonnet pond was waist-deep and bonnets (which is the southern name for squawm or spatterdock, a queer near-pondlily) covered all but an open space in the very middle about 20 ft. in diameter. Swimming about on the top of this water were ten or more little alligators from a foot to 18 inches long. The old one was probably near by in a cave. After a search which, on account of the water and the fear of the old 'gator, could not be the most thorough, this corner was allowed to stay lost. In several cases where the corner came in a slough or a pond, the heart pine or "lighter" log from which the stake had been cut was found lying on the ground beside the stake, where it had been dragged from the near-by timber, with the axe marks usually very prominent. When the corner was in timber, most of the witness trees were standing and the hacks were seen easily.

The nineteen miles of this road just before entering the 'Glades proper traverses a region that repeats itself over and over, yet is never quite the same—a ridge of pine timber, then a slough, another ridge of pine timber and another slough, over and over again.

Once in a while a diamond-back rattle snake from about 4 to 7 feet long would be encountered. When this happened, the usual method of procedure was to stick the sharp point of a range pole through it and then cut off its tail close up behind its ears with the axe. These snakes are deadly poisonous, but are sluggish and

STANDARD CONCRETE BRIDGE — EVERGLADES ROAD IN SERVICE.

*Engineer of Special Road and Bridge District No. 2.

not much to be feared unless stepped upon. They will run away if given a chance.

When this division and the other divisions at either end of it are complete, there will be a hard surfaced highway across the state of Florida from Punta Rassa on the Gulf of Mexico to Palm Beach on the Atlantic Ocean. This highway will not be uniform in the various divisions, owing to the different methods of construction. The usual method was to make a rough reconnoissance of the section, from this prepare a rough estimate of the cost, and then vote for the bond issue to construct that section. No two divisions appropriated the same amount of money per mile. If the bond issue carried, an engineer was employed to make a preliminary survey and then submit plans for as good a road as could be built across the section with the money voted. The width of the hard or improved surface of the road will vary from 12 to 15 ft., while the total widths of graded roadways vary from 16 to 24 ft.

The material for the hard surface is obtained from local borrow pits, the haul usually not exceeding one mile. From these are obtained clay, clay and pebbles, clay and shells, or clay, pebbles and shells. Some crushed rock may be used. The mixture of clay and pebbles or clay and shells makes a very good hard road, the clay serving as a binder and some of it setting up almost like concrete. This hard surface is to be made 6 inches thick. The material is excavated from the borrow pits by a Thew steam shovel and loaded into wagons hauled by four mules (some trucks will soon be placed on the jobs, probably Duplex), spread on the sub-grade which has previously been prepared by machines, rolled, scarified, shaped with a road machine, and finished with the roller.

The cost of grading will probably average 15c. per cubic yard in all divisions and the cost of the surfacing will average about 20c. per square yard.

The section of road shown in the photograph has been laid six months, this period including the rainy season, and has stood fairly heavy automobile and heavy team hauling, but has not had any maintenance work done on it at all. Formerly this road was almost impassible a good part of the year; it crosses three muck ponds and some very heavy sand in the stretch shown in the photograph.

Concrete bridges are being used wherever there are well defined streams. Wood will be used in the broad sloughs. The fill in these sloughs is from one to three feet high and the bridges placed here will be only temporary, as in time canals will no doubt be dug through the sloughs, at which time permanent bridges can be erected.

Carlton and McCormick of Labelle have the contract for the 49 miles of hard road in district No. 2. Trapp and Frazier of Ft. Myers have the contract for the 21 miles of hard road in the Caloosa valley division, which connects Ft. Myers with district No. 2. From Ft. Myers to the Gulf an asphalt road known as the McGregor

PUBLIC SCHOOL BUILDING AT LABELLE, FLA.

boulevard is already built. East of division No. 2, Palm Beach county will build a road across the 'Glades. They will dig a canal 35 ft. wide and 10 ft. deep and use the excavated material for the road.

Fine school buildings, such as that shown in the photograph, are being built along this highway and teaching forces of the best are employed for them and the equipment is good. This combination of good schools and good roads will yet make a paradise of this howling wilderness, and chase the 'gators out of their caves.

MUNICIPAL WORK IN SAVANNAH

Methods and Costs of Cleaning the Several Kinds of Pavements—Collecting and Disposing of Refuse—Use and Sale of Materials.

STREET CLEANING.

White labor is employed exclusively in Savannah, Ga., for street cleaning, but to a considerable extent the force is composed of a class which, on account of its physical condition, is unable to do an ordinary day's work; 48 per cent of those employed are over 50 years of age and 9 per cent are over 70.

The organization of the street cleaning department consists of one superintendent at $110 per month, four foremen who average $2.50 per day, and 70 laborers, including cart and wagon drivers, at $1.75 per day.

Sheet asphalt streets are cleaned daily except Sunday with scrapers. The scrapings are placed in the gutters and promptly picked up by carts. With the asphalt block and brick pavements, 40 per cent of the area is cleaned twice a week, 40 per cent three times a week, and 20 per cent once a week. Of the granite block 50 per cent is cleaned twice a week, 20 per cent three times a week and 30 per cent once a week. Cobble pavements are cleaned about once in ten days. The method of cleaning asphalt block, brick, and, to a large extent, granite block, is by horse-drawn sweepers, preceded by sprinklers, all the work being done at night. Hand brooms and scrapers are used in collecting the sweepings in piles in the gutters, these being cleaned up as formed by carts and wagons. The cobble pavements are hand cleaned with brooms.

A large proportion of the sweepings are delivered to a

Street Cleaning Costs in Savannah.

Class of Pavement	Average Width in Feet, Total	Condition of Surface.	Area in Sq. Yds.	Length in Miles	Cost of Cleaning per Year, Including Removal of Debris	Cost per Mile per Year	Cost of Cleaning per 1,000 Sq. Yds. per Year	Cost of Cleaning 1,000 Sq. Yds. per Cleaning
Concrete	30	Good	22,000	1.25	$480.00	$322.00	$22.00	$0.204
Asphalt block	35	Good	329,209	12.89	7,361.00	571.00	22.36	0.205
Vitrified brick	36	60% Good, 40% Rough	393,450	17.00	13,816.00	813.00	35.12	0.322
Granite block	31	Fair	116,962	5.95	4,800.00	807.00	41.04	0.415
Cobble stone	28	Rough	76,478	4.13	4,968.00	1.203.00	64.96	1.249
Sheet asphalt	40	Good	141,319	5.04	12,226.00	2,426.00	86.52	0.277
Totals			1,079,418	46.26	$43,650.00			

local concern, which pays the city the nominal amount of $250 per annum for same. This party picks the coarser rubbish from the sweepings and grinds the refuse, adds a certain percentage of cotton-seed meal and potash, and sells the resulting mixture in Florida as fertilizer for truck farming.

The accompanying tabulation, prepared from accurate data, gives the cost of cleaning the paved streets of the city. This tabulation shows that the cost of street cleaning is directly proportional to the smoothness of the pavement surface. It shows that the costs of cleaning concrete and asphalt block are practically the same, that of brick is considerably higher, and that the cost increases as the worn surface of the pavement increases the difficulty of properly cleaning the same. The cleaning of granite block costs much more than the smoother types. The high cost for sheet asphalt is due to the fact that it is hand cleaned.

REFUSE DISPOSAL.

During last year, in Savannah, Ga., household garbage, rubbish and ashes were collected daily except Sunday, and then one collection was made for the down town section and a part of the residential section. The amount of garbage, rubbish and cinders hauled to the destructor totalled 26,722 tons. In addition, 1,400 tons were hauled to dumps, 100 tons of cinders and ashes used for street filling, 100 tons of paper hauled to a baling establishment and 200 tons of dead animals taken to a rendering plant, a total of 28,522 tons. The cost of collection was $2.07 per ton, including all labor, maintenance of equipment, feeding and renewal of stock, etc.

Of the total refuse collected, approximately 40 to 45 per cent in weight was strictly garbage, excepting during the months of July and August, when the watermelon season was at its height. The average daily amount of watermelon and cantaloupe rinds then was approximately 20 tons, so that during these two months the actual weight of strictly garbage was not less than 55 per cent.

During the year the stable sweepings from the city lots, amounting to 1,200 tons, was sold at the lot for fertilizing purposes for $252. Dead animals, amounting to 332 horses, mules and cows, were delivered to a rendering plant for which the city received $150. There was sold also 100 tons of waste paper, for which the city received $494.

All garbage, rubbish, household wastes and cinders were disposed of by incinerating. (The Savannah plant was described in Municipal Journal, February 11, 1915). As stated above, the amounts burned in July and August were far above the average, due not only to the large amount of watermelon rinds destroyed, but also to the increased amount of cinders added to assist the burning during these two months.

An experiment was made during the watermelon season by adding a small quantity of wood in order to increase, if practicable, the amount of steam for the water works plant, and 100 cords of wood, costing $300, were used for this purpose. This was not really necessary to consume the wet garbage, but merely to increase the generating of steam. This was the only fuel used at the plant during the year.

The total cost of operating the plant was as follows:

Incinerator operation	$17,575.79
Weighing refuse and delivery of same to the hoppers	1,554.70
Maintenance	4,082.26
Total	$23,212.75
Credit for steam furnished the Water Dept.	4,182.00
Total	$19,030.75

making a net cost of operation 72 cents per ton.

The cost of removing clinkers was $1,791.50 and the estimated quantity of clinker removed was 6,000 tons.

A considerable quantity of hard clinker was used for surfacing some of the outlying streets, some sold for filling purposes and the remainder for filling in city's land, so that it may be considered that the cost of removing the clinker is covered by proceeds of sale by enhancing value to low lands owned by the city, and for streets or road improvement.

The above and all other public work, such as paving, sewers, water supply, etc., are in charge of E. R. Conant, chief engineer of the city, from whose annual report the above were taken.

FIREMEN'S PENSIONS AND BENEFITS

Items of Information Concerning These from Several Cities—How Funds Are Raised and Systems of Payment.

Supplementing the tabulated data given in the issues of November 15th and 22nd, we give below a number of items concerning pensions and benefits for firemen that could not well be given in the tables.

PENSIONS AND BENEFITS.

In the cities of Illinois the firemen are protected by the Illinois State Firemen's Association Indemnity Insurance Fund, under which, if hurt while going to or returning from or working at a fire, the association pays $2 per day for the period of disability and pays the amount of one assessment in case of death.

In Davenport, Iowa, the city assesses with the general taxes up to one-half mill for the pension fund and the firemen pay 1 per cent of their salaries to such fund. The city pays wages for 1 year to a fireman who is hurt or sick. The firemen also carry insurance in the Police and Firemen's Insurance Association of Indianapolis at a cost of $1 to $1.50 a month. The Benevolent Firemen's Association allows $200 death benefit and $5 per week sick or accident benefits. Firemen can retire after 22 years of service when they are 50 years of age, a pension being required by the state law.

The state of Kansas collects from fire insurance companies doing business in that state 2 per cent of their premiums in towns maintaining a volunteer fire department, which money is turned over to the relief associations of the volunteer companies to pay sick or accident benefits in case such sickness or accident was caused by attendance at a fire. Eighty per cent of this money may be spent for equipment.

Chief Wm. C. Green, of Concord, N. H., reports that the State Firemen's Association receives $4,000 annually from the state, and in case of accident to firemen assists in paying the benefit. The Concord Firemen's Relief Association, supported by dues and donations, pays $300 in case of death and $1.50 a day for injury, while the state association pays $1,200 and $2 a day.

In Albany, N. Y., the members of the fire department contribute 1 per cent of their salaries to a pension fund; and all fines or penalties imposed, all rewards of money, gifts or endowments made because of extraordinary services rendered, are added to the fund. In case the pension fund should become depleted, the city is to make it up. Each member also pays $1 per month into an insurance fund and receives a life insurance of $500, to be left to whomever he may designate in writing.

Columbus, Ohio, pays firemen full salaries in case of injury received while performing their fire duty, continuing this for a period of six months, after which he is

placed on a pension if not able to return to duty. The benevolent association pays $1 a day.

In Oklahoma the state has created a Firemen's Relief Pension Fund, into which the state pays 1 per cent of all foreign insurance that is written in the state, the same being distributed to the different towns according to the amount of insurance written therein. The fund for each town is in charge of a board consisting of the mayor, city clerk, city treasurer and two elected firemen, which board looks after the needs of the sick and crippled firemen and allows the bills. For this information we are indebted to George Gattis, chief of Chickashaw.

In Nashville, Tenn., the city contributes one-tenth of a mill for each dollar of taxable property to the pension fund and the firemen pay 1 per cent of their salaries.

Pennsylvania maintains a state fund for firemen's relief, which is derived from 1 per cent of the fire insurance premiums paid to foreign insurance companies. Payments are made to the various cities and towns and are kept in a fund by them for this purpose. For instance, Clearfield now has $7,000 in its treasury and in case of injury pays the hospital and doctor's expenses and $7.50 per day. Plymouth has about $6,000 in its treasury and pays $10 per week for five weeks.

In Tacoma, Wash., population 120,000, the pension fund receives one-half mill of the tax levy, which furnishes about $5,000 a year. The pension fund is operated under the state law and is kept up by 1½ per cent of the firemen's salaries. In addition, the firemen maintain a pension fund and relief association which pays benefits in addition to those received from the city pension fund. The city pays the regular salaries for a period of 6 months in case of sickness or injury resulting from performance of their work as firemen. After the expiration of six months, those who have not recovered are placed on pension of half salary, which continues until they are able to return to duty.

MISCELLANEOUS NOTES.

The Tacoma, Wash., fire department began operating under the two-platoon system on Sept. 12, and Chief Carl E. Carlson states that since that time the department has been short of men and has not been able to keep up the building inspection. He hopes, however, to renew this inspection as soon as possible, as they have found that the number of fires has been reduced since systematic inspection began.

Chief Albert Herring, of Murphysboro, Ill., is quite proud of his work in fire prevention. This work was started by him in 1914 and he is very enthusiastic over the results obtained. One of his ideas is to give out blanks to the school children just previous to fire prevention day and ask them to inspect their homes and report on the conditions found therein by filling out the blanks, offering three prizes for the best reports turned in. Through the children the interest is passed on to the parents, with the result that the citizens of Murphysboro take more interest in fire prevention than those of the great majority of cities.

FIRE APPARATUS IN SERVICE

On pages 537 to 540 of this week's issue will be found the first half of a tabulated list of motor fire apparatus in service in about five hundred cities of the United States. This is the fourth of seven tables compiled from information furnished by the fire chiefs during October, the first two of which appeared in the November 8th issue. The others, which will follow in the December issues, will give the average mileage per year run by each kind of apparatus, the miles run per gallon of gasoline, and the amount of auxiliary equipment, such as pulmotors, oxygen helmets, searchlights, hand extinguishers, solid and pneumatic tires, feet of hose, and type of fire alarm system. Data concerning expenditures for fire department purposes will be given later.

MINNESOTA FIRE MARSHAL DEPARTMENT.

Since publication in the Nov. 8th issue of the descriptions of the fire marshals' departments of a number of states, we have received that of the Minnesota department, the delay being due chiefly to the fact that a change has just been made in the status and personnel of the department. This information was furnished by Geo. H. Nettleton, chief assistant fire marshal, who is in charge of the fire marshal's office under the Commissioner of Insurance and Fire Marshal, John B. Sanborn.

In 1905 the state legislature passed an act "to prevent unjust discrimination in the fixing of fire insurance premiums, to provide for the appointment of a fire marshal and defining his duties, and to provide additional revenue for the enforcement of such act." The office of fire marshal was created and given a salary of $2,500 a year, but no other appropriation made. The first fire marshal employed a stenographer out of his own salary, and when that was used up, practically suspended operations until the 1907 legislature met, since which year larger appropriations have been made, raised by a tax paid by the fire insurance companies.

The State Fire Marshal's Department was maintained as an independent branch of the government up to August 1st, 1917, when the governor decided to reduce state expenses by eliminating the office and placing the department under the state insurance commissioner, the work of the fire marshal being performed directly by the assistant state fire marshal. There are now nine employees of the department, including five deputy marshals, two stenographers, a clerk and a secretary. The deputies are kept travelling about the state, prosecuting incendiaries, condemning fire hazards and enforcing the clean-up recommendations of the fire marshal.

Prior to this year, the work of the fire marshal might be said to have been of an educational or advisory character, its powers being questioned, although its orders were generally complied with. It conducted an educational campaign throughout the state, with the co-operation of the newspapers and the general public. Recently its powers have been amplified so that now it may not only recommend removal of dilapidated structures, but also issue orders to owners to remove them and, if such orders are not complied with within a reasonable time, may remove such buildings itself and charge the expense to the owner. Many such condemnations have taken place and structures which have been a menace to surrounding property in St. Paul, Minneapolis and Duluth have been sold at auction by the fire marshal's department with the understanding that they be torn down, the proceeds of the sale minus the expenses of the sale being turned over to the owner.

Surveys of communities are made through local fire departments with the assistance of deputy fire marshals. They have been specially instrumental in bringing to the attention of the local authorities the necessity for removing structures which, though not themselves fire menaces, might hinder the work of fighting a real fire. In all cases the local authorities have been willing to co-operate with the state department. The department advises communities to organize fire prevention work and has prepared model ordinances for the guidance of local law-making bodies which uniformly have been adopted.

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City officials and civic organizations are particularly requested to send Municipal Journal regularly their annual and special reports.

Information Bureau.

Municipal Journal's Information Bureau, developed by twenty-one years' research and practical experience in its special field, is at the command of our subscribers at all times and without charge.

COAL AND PUBLIC UTILITIES.

During the past month probably no matters of public interest have received more general attention from the public than the shortage of sugar, wheat and coal. The private citizen probably has been most concerned with the food problem, but managers of water works, electric light and power plants have found the shortage of coal a cause of continuous apprehension. The Council of National Defense has done more than many realize to prevent this shortage from producing serious consequences in any section of the country. But for their action such consequences would undoubtedly have occurred in many places.

The Advisory Committee on Gas and Electric Service (a co-operative committee of the Council of National Defense) is endeavoring to facilitate shipments of coal and other necessary materials to public utilities whose uninterrupted functions are vital to the welfare of the communities which they serve. It wishes to assist all such public utilities which find it difficult or impossible to maintain a sufficient supply to keep their plants operating, and requests that the proper officials of any water works or electric lighting plant, whether municipally or privately owned, communicate at once with the secretary of the committee, Geo. W. Elliott, Munsey Bldg., Washington, D. C., should they experience difficulty in obtaining shipments of coal sufficient to meet their immediate needs.

While the committee offers its services to such plants, it also expects from them co-operation to the extent of refraining from hoarding coal, and also by using the greatest care in conserving it in the operation of their plants. Many ways in which such conservation can be effected are suggested by the Committee on Coal Conservation of the Chamber of Commerce of the United States. These include, for certain small plants, the buying of power from special power plants which can utilize coal more effectively in creating power than can ordinarily be done by a small plant; using the kind of coal that is mined nearest at hand, thus reducing the tax on the transportation system of the country; using every effort to increase the skill and proficiency of the men who handle the coal; putting the fuel-using equipment into as perfect condition as possible, such as stopping leaks in a boiler setting, replacing defective grate bars, etc.; installing simple and convenient means by which the fireroom force may see results of their operations, such as scales for weighing fuel and ash, meters for measuring water, etc.; running each boiler at its most effective capacity, which may permit one or more to be dropped from service; preventing the formation of scale in the boiler, by changing the source of water supply or by treating the water if necessary; reducing losses of heat after it is generated by covering boiler surfaces and steam pipes, seeing that joints and valves in steam lines are tight, cutting out useless steam lines, etc.; finally, obtaining the advice of an expert steam engineer as to the carrying out of these recommendations. The above will all tend to reduce the coal bills of the users. Some have failed to adopt these methods because the savings made possible thereby, based on former prices of coal, were less than the cost of the changes in operation. But the higher prices now prevailing have increased the saving possible sufficiently in many cases to show a profit from such increased efficiency. But even where the operator cannot figure an actual saving in operating costs by adopting these methods of saving coal, it is his patriotic duty to adopt them for the general welfare of the country at large. It offers a direction in which he can do his bit and feel assured that all the saving he can thus effect will be of direct benefit to his country.

ROAD CONSTRUCTION MUST CONTINUE.

The consternation caused by the promulgation without warning of the embargo on road materials has been relieved to a considerable extent, so far as apprehensions for next year are concerned, by the appointment by the Council of National Defense of a Highway Transport Committee, the purpose of which is to obtain relief from railroad congestion by the more extensive use of the public highways and the handling of short-distance hauls by motor trucks, and by the announcement that it is expected that the embargo will be removed or considerably moderated as soon as the critical condition of the coal distribution problem has been alleviated. This will not permit the renewal, this fall, in many sections of the north, at least, of such road work as requires the use of imported road materials, but it is expected to permit the delivering of such materials in time for the opening of the construction season next spring.

Last week we referred to the duty of highway authorities to inform themselves concerning all material suitable for street and road work that could be obtained within practicable truck-hauling distance. We also called attention to the fact that this was highly essential even though no embargo on road materials should continue, because of the fact that the railroads were unable to handle the freight now being delivered to them, and the amount was certain to be greater next year with the increased output of all manner of industries connected with the prosecution of the war.

If roads could be classed as non-essentials to the war program, it would be our patriotic duty to relieve the railroads of any burden caused by transportation of highway materials and probably to discontinue road construction almost altogether. But as a matter of fact the highways are almost if not quite as essential as the railroads themselves. Aside from munitions, practically all materials, and especially the foodstuffs, are brought to the railroads over the highways; and if the highways should become impassable, the railroads will render no service so far as hauling such materials is concerned. It has been stated time and again that food will prove even more important a factor in winning this war than ammunition. But practically all of the food is grown miles from the railroads and can reach it only over the highways.

We see therefore that as feeders of the railways, the highways are an absolute essential to the winning of the war. This means the improving and maintaining of a sufficient number and distribution of highways to reach all of the farming districts of the United States and connect them with the shipping centers.

There is another most important consideration, however. It is apparent and admitted that the railways have reached practically their limit of transportation capacity and still have not equalled the task which will be presented by next year's activities. This could be met by the manufacture of more locomotives and freight cars, but with this would come increased difficulties of operation and increased demands upon terminal facilities; while the construction of the added rolling stock would make demands upon the steel and iron supply and manufacturing plants that would be to the detriment of the shipbuilding and munition program. It would also involve in many cases a more rapid renewal of existing rails and the extension of track-mileage, to which the same objection of steel consumption is opposed.

A considerable part of the freight traffic consists of comparatively short hauls, and in spite of the great improvements which have been made in handling this class of freight (by which the facilities of the railroads for such work have this year been increased possibly threefold), the withdrawal of all short-haul freight from the railroads would add greatly to their capacity for long-haul business. This short-haul should, therefore, so far as possible, be taken care of by the only other traffic medium which is apparently available—motor trucks using the highways.

Such use of the highways will require the highest grade of pavement construction. If the best grade of pavement can be constructed with local materials, this, of course, should be done; but if it cannot, then adequate materials should be brought in for the purpose. Where such materials can be obtained within 50 or 100 miles, it is desirable that they be brought by truck rather than by placing the burden upon the railroads. This might add somewhat to the cost of the highway construction, but not so much as some might think, as we shall endeavor to show next week. At any rate, main highways for handling this short-haul freight service and laid out with the purpose not so much of serving as feeders to the railroads as for supplementing the railroads, should be planned at once and carried to completion as soon next year as weather will permit as one of the foremost duties of the nation at this time.

This necessity for the combined action of the road builders and the motor truck manufacturers suggests the desirability of having a representative of the latter upon the Highways Transport Committee. This is being urged by the Ohio Good Roads Federation and others and would seem to be highly desirable.

To sum up: It seems to be manifest that a large part of the burden of winning the war has fallen upon the shoulders of the United States, and that the providing of munitions and food is the most important element of our duty. By no means the least important and necessary part of this is the collecting and forwarding of the food, clothing and munitions, and it is apparent that a vital part in this must be played by the highways of the country. Unless we keep in condition the secondary roads over which the food is concentrated to main shipping stations, the main highways over which freight is carried by automobiles for the relief of the railways, and the streets of the cities over which are hauled the raw materials to the factories, the finished products of munitions and clothing taken therefrom and the freight in transfer from railroad to dock or vice versa—unless these things are all attended to and all the energies of those entrusted with this work are bent to the most effective solution of this problem, we shall fall short of our duty.

DIRT ROADS AND THE WAR.

Thousands of miles of the roads which furnish the only outlets from the farms on which is grown the food for ourselves and our allies still remain as dirt roads. Even if it should be considered justifiable in this emergency to place the most durable surface upon all of these roads, it would be impracticable today or in one year or two or three. Most of them must remain as dirt roads for years to come yet. They must, however, carry to the shipping centers, and without serious interruptions, the increasing quantities of grains and other food products which are so vitally necessary at this critical time.

The problem of maintaining dirt roads has therefore become a more important one than ever, and county and state highway authorities should see to it that every effort is made to put all of these roads into the best possible condition as soon as practicable. There is still time this fall to do considerable grading and shaping of roads so as to permit them to resist more successfully the effects of winter weather, and be in better condition in the spring for immediate use or more rapid improvement. All highway officials are now familiar with methods of treatment that will prevent excessive rutting, such as the use of the drag, scraper and other simple means, and these should be employed now and whenever advantageous throughout the winter in order to prevent the formation of ruts and mud-holes, which make so difficult the putting of the roads into shape when the frost goes.

In a great many localities it is possible to improve dirt surfaces with local materials at comparatively little cost, such as by the construction of sand-clay roads, by gravel surfacing, etc. Advantage may be taken of the comparative idleness of teams and farmers during the winter to haul the sand, gravel or clay necessary for this purpose and distribute it along the sides of the road ready for use as soon as weather conditions permit in the spring. Even the snow plow can be used to advantage in many cases to prevent the concentration of all traffic to a single pair of wheel tracks through the snow, which generally results in a cutting through of the road surface along these two lines, to the detriment of the road.

Much of the above applies to northern climates. In many parts of the Southern States maintenance and construction of roads can be continued throughout the winter. In such localities work should be begun promptly and continued to insure that there shall be no delay at any time in getting to the distribution centers all the marketable foodstuffs grown anywhere in the state.

MOTOR APPARATUS IN SERVICE.

City and State.	Chief's Cars.	Chemical and Hose With Ladders.	Chemical and Hose Without Ladders	H. & L. Trucks.	Triple Combinations.	Hose Wagons.	Tractors.	Chemical Engines.	Gasoline Pumping Engine With Hose.	Gasoline Pumping Engine Without Hose & Chem.	Gasoline Pumping Engine With Chemical.	Gasoline Driven Steam Pumper.	Fuel or Service Wagons.	Repair Wagons.	Squad Wagons.	Water Towers.
Alabama:																
Brewton	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....
Gadsden	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Huntsville	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....
Selma	1	1(1)	2	....	1	1	....	....	1	....	1	....	....	....	....	....
Arizona:																
Bisbee	1	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....
Douglas	1	1	....	1	....	....	....	....	....	....	....	....	....	....	....	....
Nogales	....	1	....	....	....	....	....	....	1	....	....	....	....	....	....	....
Phoenix	2	3	....	1	....	....	....	....	1	....	....	2	....	....	....	....
Arkansas:																
El Dorado	1	....	1	....	....	(1)	....	....	....	....	....	....	....	....	....	....
Ft. Smith	2	3	....	....	1	....	1	....	1	....	....	....	....	....	....	....
Jonesboro	....	1	....	1	....	1	....	....	....	....	....	....	....	....	....	....
Little Rock	2	2	....	1[2]	2	2	1	....	4	....	....	....	1	....	....	....
Prescott	....	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Russellville	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
California:																
Alameda	1	....	4	1	....	....	....	....	....	2	....	....	....	....	....	....
Berkeley	2(1)	6	....	1	....	1	1	2	....	1	....	2	....	....	....	....
Bishop	....	1	1	1	....	3	....	....	....	....	....	....	....	....	....	....
Coalinga	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Emeryville	....	....	....	....	....	....	1	1	....	....	....	....	....	....	....	....
Hayward	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Long Beach	1	....	....	1	1	1	....	1	2	....	....	1	....	1	....	....
Modesto	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Monrovia	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....
Oakland	6	4	....	5	3	....	2	2	3	1	3	1	1	....	1	....
Palo Alto	....	1	1	1	....	3	....	1	....	....	....	....	....	....	....	....
Pasadena	2	3	....	1	1	....	....	1	5	....	....	....	1	....	1	....
Petaluma	....	....	1	....	....	....	....	....	1	....	....	....	....	....	....	....
Pomona	....	....	....	1	....	....	....	1	1	....	....	....	....	....	....	....
Redlands	1	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Richmond	2	3	....	....	....	....	....	....	1	....	....	....	....	....	....	....
San Leandro	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
San Rafael	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Santa Ana	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Santa Barbara	....	....	1	....	1	....	....	....	....	....	....	....	....	....	....	....
Santa Monica	1	2	....	....	1	....	....	....	....	....	....	....	....	....	....	....
Santa Rosa	....	1	....	....	....	1	....	....	....	....	....	....	....	....	....	....
Stockton	1	4	....	....	....	....	....	....	4	....	....	....	....	....	....	....
Ventura	....	....	1	....	1	....	....	....	....	....	....	....	....	....	....	....
Watsonville	1	....	....	1	1	1	....	....	1	....	....	1	....	....	....	....
Whittier	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Colorado:																
Boulder	....	2	....	....	....	....	....	1	....	....	....	....	....	....	....	....
Colorado Springs	2	4	....	2(1)	1	....	1	....	....	....	1	....	....	....	....	....
Fort Collins	....	1	....	....	....	1	....	....	....	....	....	....	....	....	....	....
Grand Junction	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Longmont	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Trinidad	1	....	2	2	....	1	....	....	....	....	....	....	....	....	....	....
Salida	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Connecticut:																
Bridgeport	3	2	10	5	2	10	2	2	9	....	9	2	3	1	....	....
Danbury	1	3	2	1(1)	1	1(1)	....	....	....	....	....	....	2	....	....	....
Greenwich	....	1	....	1	....	1	....	1	....	....	....	....	....	....	....	....
Hartford	5	....	5	5	7	....	2	....	....	....	....	2[3]	....	....	1	1
New Britain	1	2	....	1	3	....	....	....	....	....	....	....	....	....	....	....
New Haven	6(1)	4	....	1	....	....	....	....	7	....	....	....	1	1	1	....
Norwich	1	....	1	....	1	....	....	....	....	....	....	....	....	....	....	....
South Manchester	1	1	3	3	....	1	....	....	1	1	....	....	....	....	....	....
Stratford	....	1	....	....	....	1	....	....	....	....	....	....	....	....	....	....
Suffield	1	....	1	1	....	2	....	....	....	....	....	....	....	....	....	....
Torrington	....	2	....	....	1	....	....	....	1	....	....	....	....	....	....	....
Waterbury	2	1	....	1	2	(1)	....	1	3	....	....	....	1	....	....	....
Wethersfield	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....
District of Columbia:																
Washington	9(1)	....	....	4	....	10	9	....	3(1)	2	....	6	....	....	....	....
Florida:																
Daytona	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Lakeland	....	1	....	....	1	....	....	....	....	....	....	....	....	....	....	....

For footnotes, see page 540. *Figures in parentheses refer to apparatus in reserve.*

MOTOR APPARATUS IN SERVICE (Continued).

City and State.	Chief's Cars.	Chemical and Hose With Ladders.	Chemical and Hose Without Ladders	H. & L. Trucks.	Triple Combinations.	Hose Wagons.	Tractors.	Chemical Engines.	Gasoline Pumping Engine With Hose.	Pumping Engine Without Hose & Chem.	Gasoline Pumping Engine With Chemical.	Gasoline Driven Steam Pumper.	Fuel or Service Wagons.	Repair Wagons.	Squad Wagons.	Water Towers.
Florida (Continued):																
Plant City	....	....	....	1	....	2	....	2	....	....	....	....	....	....	....	....
Quincy	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....
St. Augustine	....	....	....	1	1	1	....	....	....	....	....	....	....	....	....	....
St. Petersburg	1	....	....	....	....	1	....	....	1	....	....	....	....	....	....	....
Sarasota	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....
West Tampa	....	1	....	....	1	....	....	....	....	....	....	....	....	....	....	....
Georgia:																
Americus	....	2	....	1	1	2	....	....	....	....	1	....	....	....	....	....
Athens	1	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Atlanta	4	....	....	3	6	....	1	1	....	....	....	....	....	....	....	....
Brunswick	1	1	....	....	1	....	....	....	....	....	....	....	....	....	....	....
Carrollton	....	2(1)	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Douglas	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Moultrie	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....
Newman	1	....	....	....	1	1	....	....	....	....	....	....	....	....	....	....
Rome	1	2	....	1	1	1	1	....	1	....	....	....	....	....	....	....
Valdosta	....	1	....	1	....	....	....	....	....	....	....	....	....	....	....	....
Idaho:																
Boise	1	4	1	1	....	....	1	....	....	....	....	....	....	....	....	....
Pocatello	1	1	....	....	....	....	....	1	1	....	....	....	....	....	....	....
Illinois:																
Aurora	1	5	....	....	....	....	1	....	....	....	....	....	....	....	....	....
Belvidere	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Bloomington	1	4	....	1	....	....	....	....	....	....	....	....	....	....	....	....
Cartersville	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....
Cairo	1	3	....	....	1	1	....	....	1	....	1	....	....	....	....	....
Carrollton	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....
Champaign	1	2[2]	....	1	....	....	....	....	1	....	....	....	....	....	....	....
Charleston	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....
Chicago	33(5)	....	37(2)	34(5)	....	91(21)	15	10	16	....	....	8	28	1	3	1
Chicago Heights	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Du Quoin	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Dwight	....	....	....	....	1	1	....	....	1	....	....	....	....	....	....	....
East Moline	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....
East St. Louis	2	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....
Elgin	1	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Evanston	1	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....
Granite City	....	....	....	....	....	1	....	....	1	....	....	....	....	....	....	....
Highland Falls	....	1	....	1	....	3	....	1	....	....	....	....	....	....	....	....
Jacksonville	1	....	(1)	....	2	....	....	....	....	....	....	....	....	....	....	....
Joliet	1	1	....	1	2	....	1	....	2	....	....	....	1	....	....	....
Macomb	1[3]	1	....	....	....	1	....	1	....	....	....	....	....	1	....	....
Murphysboro	1	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Normal	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....
Pana	....	....	....	....	1	1	....	....	....	....	....	....	....	....	....	....
Paris	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....
Paxton	....	....	....	1	1	....	....	....	....	....	....	....	....	....	....	....
Pekin	....	....	....	....	1	1	....	....	....	....	....	....	....	....	....	....
Waukegan	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Witt	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Woodstock	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Indiana:																
Anderson	1	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....
Bloomfield	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....
Decatur	....	1	....	1	....	1	....	....	....	....	....	....	....	....	....	....
Elkhart	1	1	....	....	....	3	....	....	1	....	....	....	....	....	....	....
Frankfort	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1
Garrett	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....
Gary	1	2	2	1	....	3	....	....	....	....	....	....	....	....	....	....
Kendallville	....	....	....	....	1	1	....	....	....	1	....	....	....	....	....	....
Kokomo	1	1	....	1	....	....	....	....	2	....	....	....	....	....	....	....
La Fayette	1	4	1	1	....	....	....	1	....	....	....	....	....	1	....	....
La Porte	1	1	....	1	1	....	....	....	....	....	....	....	....	....	....	....
Martinsville	..	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Plymouth	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Richmond	1	5	....	1	....	....	....	....	....	....	....	....	....	....	....	....
Shelbyville	....	1	1	....	....	....	....	....	....	....	....	....	1	1	....	....
Terre Haute	3	7	....	4	3	....	....	....	....	....	....	....	....	....	....	....
Vincennes	1	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Wabash	....	1	....	1	....	1	....	....	....	....	....	....	....	....	....	....
Warsaw	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Washington	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Whiting	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....

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MOTOR APPARATUS IN SERVICE (Continued).

City and State.	Chief's Cars.	Chemical and Hose With Ladders.	Chemical and Hose Without Ladders	H. & L. Trucks.	Triple Combinations.	Hose Wagons.	Tractors.	Chemical Engines.	Gasoline Pumping Engine With Hose.	Pumping Engine Without Hose & Chem. Gasoline	Gasoline Pumping Engine With Chemical.	Gasoline Driven Steam Pumper.	Fuel or Service Wagons.	Repair Wagons.	Squad Wagons.	Water Towers.
Walpole	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Waltham	1	2	....	....	....	....	....	1	1	....	....	....	2	....	....	....
Ware	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....
Watertown	1	1	....	1	1	....	....	1	....	....	....	....	....	....	....	....
Wellesley	1	2	....	1	....	....	....	....	....	....	....	....	....	....	....	....
Westford	1	....	....	....	....	3	2	....	....	....	....	....	....	....	....	....
Winthrop	1	1	....	2	....	1	....	....	1	....	....	....	....	....	....	....
Worcester	5	9	12	1	5	2	....	....	5	....	5	....	3	....	1	1
Michigan:																
Albion	....	1	....	1	....	1	....	....	....	....	....	....	....	....	....	....
Alpena	1	1	....	....	1	1(1)	....	....	....	....	....	....	....	....	....	....
Ann Arbor	....	....	....	2	....	....	....	....	2	....	....	....	....	....	....	....
Battle Creek	1	1	....	1	4	....	....	....	....	....	....	....	....	....	....	....
Cadillac	....	....	1	....	....	1	....	....	....	....	....	....	....	1	....	....
Detroit	10(3)	14	2	12	1	16	11	1	17	16	1	....	6	1	4	1
East Jordan	....	....	1	1	....	....	....	....	....	....	....	....	....	....	....	....
Greenville	....	1	....	....	....	1	....	....	....	....	....	....	....	....	....	....
Holland	....	....	....	1	1	....	....	....	....	....	....	....	....	....	....	....
Lapeer	....	....	....	....	1	1	....	....	....	....	....	....	....	....	....	....
Iron Mountain	....	2	....	....	....	1	....	....	....	....	....	....	....	....	....	....
Marquette	1	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....
Manistee	1	....	1(1)	....	1	....	....	....	....	....	....	....	....	....	....	....
Pontiac	1	3(1)	....	1	....	....	....	....	....	....	1	....	....	....	....	....
Wyandotte	....	1	....	....	....	1	....	....	....	....	....	....	....	....	....	....
Minnesota:																
Anoka	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Bemidji	....	1	....	....	....	1(1)	....	....	....	....	....	....	....	....	....	....
Chisholm	....	....	2	1	1	....	....	3	....	....	....	....	....	....	....	....
Cloquet	....	....	....	1	1	2	....	(2)	....	....	....	....	....	....	....	....
Detroit	....	1	....	....	1	....	....	....	....	....	....	....	....	....	....	....
Duluth	1(1)	2	....	3	3	....	....	....	....	....	....	....	....	....	....	....
Little Falls	1	1	3	1	....	1	1	2	....	....	....	....	....	....	....	....
Minneapolis	5(1)	5	....	1	6	....	3	....	....	....	....	....	....	....	....	....
St. Cloud	....	1	....	....	....	....	....	....	....	....	....	....	....	....	3	....
St. Paul	6(2)	....	1	3(1)	....	1	4	....	3	1	....	2	....	....	2	1
Stillwater	....	....	1	....	....	....	....	....	1	....	....	....	....	....	....	....
Thief River Falls	....	1	1	1	....	....	....	....	....	....	....	1	....	....	....	1
Two Harbors	....	....	....	1	....	1	....	....	....	....	....	....	....	....	....	....
Virginia	1	2(1)	....	....	1	....	....	....	....	....	....	....	1	....	....	....
Willmar	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....
Winona	1	2	....	....	....	....	....	....	....	....	....	....	1	....	....	....
Mississippi:																
Jackson	1	3	....	1	1	....	1	....	....	....	....	....	....	....	....	....
Vicksburg	1	2	....	1	....	....	....	....	....	....	....	....	....	....	....	....
Missouri:																
Cameron	....	1	....	....	....	1	....	....	....	....	....	....	....	....	....	....
Carthage	....	1	....	1	....	....	....	....	....	....	....	....	....	....	....	....
Chillicothe	....	....	1	1	....	1	....	....	....	....	....	....	....	....	....	....
Hannibal	....	2	1	1	....	....	....	....	....	....	....	....	....	....	....	....
Kansas City	5	13	....	6	....	2	4	....	1	....	....	....	....	....	....	....
Maryville	....	2	....	....	(1)	....	....	....	....	....	....	....	....	....	....	....
Moberly	....	1	....	....	....	1	....	....	....	....	....	....	....	....	....	....
Monett	....	1	....	1	....	....	....	....	....	....	....	....	....	....	....	....
St. Louis	14	....	....	6	....	1	4	....	13	....	....	....	2	1	....	....
Springfield	1	1	....	2	....	2	....	1	1	....	....	....	1	....	....	....
Washington	....	1	....	1	....	1	....	....	....	....	....	....	....	....	....	....
Webster Groves	2	1	....	....	1	....	....	....	....	....	....	....	....	....	....	....
Nebraska:																
Norfolk	....	1	....	1	....	....	....	....	....	....	....	....	....	....	....	....
Nebraska City	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Nevada:																
Reno	....	....	3	1	....	....	....	....	1	....	....	(2)	....	....	....	....
New Hampshire:																
Concord	....	....	5	....	....	....	....	....	1	....	....	....	....	....	....	....
Laconia	....	2	1	2	1	2	....	....	....	....	....	1	....	2	....	....
Nashua	1	1	....	....	....	....	....	....	....	....	....	....	....	....	1	....

[1]Steam propelled; [2]2 aerials; [3]to be delivered; [4]with tractor; [5]these are on steamer and H. & L. trucks; [6]owned by chief; [7]2 are aerials; [8]part are aerials; [9]with ladders; [10]each combination tows a steamer; [11]drawn by combination; [12]4 on hand, 3 contracted for; [13] 7 attached to H. & L. trucks and 22 to steam fire engines.

The WEEK'S NEWS

Road Developments in New Jersey, North Dakota, Texas—Health Conditions in Army Camps—Control of Sanitary Improvements in Minnesota—Cleveland's Filtration Plant—Hamilton's Water System Inadequate—Dimming the Advertising Sign—Heat Unit Reduction Fails in Indiana—San Francisco Wins Gas Rate Case—Shreveport Abolishes Segregated District—Government Control of Explosives—Norfolk, Va., Wants City Manager—Air Highways Planned.

ROADS AND PAVEMENTS

Completing Military Road Under Difficulties.

Wrightstown, N. J.—In spite of the fact that the Priority Board at Washington refused to make an exception of the state highway commission in the matter of exemption from embargo of the stone required for the Wrightstown road from Georgetown, work on that job is progressing at a rate that has brought forth considerable favorable comment from prominent contractors. Adverse conditions, under which the state highway department was forced to work, instead of retarding the progress of the road, has served as sort of an impetus to the engineering department to complete the work by the first of the year. The state highway department is building the road under its own supervision with the aid of convict labor. It expects to establish a record for construction when the four-mile job is finished, within two months. Not until the first of November was work begun, but already the four and one-tenth miles have been graded and stone is being laid. The road, upon completion, will be bituminous macadam, penetration type. Water-bound macadam was found to be out of the question at this time of the year. The binder to be laid under the supervision of the state highway department will be a hot bitumen mixture, to be transported to the job in specially heated tanks from Philadelphia. Edward E. Reed, division engineer of the department, is in direct charge of the work, and the actual construction operations are under the foremanship of Richard Delaney and John Stanley, department road foremen, while the purchasing and accounting on the work is being done by Robert A. Exton, clerk of convict labor for the department.

Road Activities in New Jersey.

Trenton, N. J.—Surveys of the fifteen routes of the proposed state highway system and estimates of cost for every section have practically been completed, the state highway commission reports in a semi-annual statement submitted to Governor Edge. In addition, General Goethals, state engineer, has given assurances that a full report and final estimates of cost for the highway system will be submitted to the commission at its meeting next month. Actual construction may be begun about April 1. The commission has been advised that probably $3,165,000 derived from the road tax will be available for the first year's work, which, it is expected, will include the construction of nearly 100 miles of roadway in the new system. In addition to the tax receipts, about $2,000,000 from the motor vehicle fund will be available for apportionment to the various counties for repair work. Thus far the allotments for repairs for the past year amounts to nearly $1,500,000. Location of Camp Dix at Wrightstown and Camp Merritt at Tenafly has imposed an additional burden on the road department. Improvement of the road from Wrightstown to Georgetown is being carried on by the department with convict labor, and it is expected that the four miles under reconstruction will be completed within two months. The road will be bituminous macadam of the penetration type. Water-bound macadam was found to be out of the question at this time of the year. It is estimated that the work will cost approximately $90,000. At Camp Merritt, Tenafly, the commission has under construction a stretch of two miles of highway. The report shows that convict labor has been successfully employed throughout the state, five camps having been established for this purpose. Figures showing the amount of money expended for convict labor will be submitted to governor Edge within the next month. It is said that these will show a considerable saving in the cost of road construction. During the six months that the present commission has been in existence contracts amounting to $146,151 have been let, completed and paid for. This does not include several miles of road construction for which contracts were awarded prior to the organization of the commission. The commission awarded contracts and paid for seven and a half miles of roadway as follows: Salem County, $44,325; Bergen, $28,476, Mercer, $5,036; Union, $45,108; Passaic, $23,204; besides a number of contracts now in process of completion.

Surveys Completed for Big Mileage.

Bismarck, N. D.—The state highway commission has completed field work on 15 miles of road in Sargent, 21 in Barnes, 12 in Pierce, 18 in Benson, 12 in Eddy, 35 in Stutsman, 25 in Ramsey, 20 in Stark, 13 in LaMoure, 21 in Bowman 16 in Foster and 21 in Towner counties, all of which are projects which have been approved for federal aid under the post roads act. Surveys have wholly been completed in Benson, Cass, Cavalier, Foster, Grand Forks, Griggs, Richland, Traill and Williams counties on projects totaling 173.1 miles and the projects which the commission has undertaken during the first year of its existence and which it hopes to have ready for bids by January 1 aggregate 478.8 miles.

Texas Asks for Road Materials Priority.

Austin, Texas.—The state highway commission has written to Col. R. S. Lovett, at Washington, the following letter regarding the recently promulgated embargo on road materials: "The state highway commission of Texas desires to voice its approval and assent to priority order No. 2, denying the use of open freight cars for shipments of materials and supplies for the construction, maintenance or repair of public or private highways, roadways, streets or sidewalks for the reason that the same, as we regard it, is conceived in the high and laudable purpose and plan to give preference to the transportation of food and fuel over the railways of this country. We would be other than patriotic if we did not regard this order in this light, now that we wish it understood that we request or petition that the same be rescinded or modified in any particular until a changed situation should demand it. We, however, respectfully call your attention to the fact that the construction, maintenance and repair of certain public roads and highways is in a measure helpful to the railroads in the proper transportation of food and fuel and that in some instances where the railroads do not reach into the very productive food and feed fields it is necessary for the construction, maintenance and repair of these highways that the short haul road may become an aid and adjunct to the railroads; and that, secondly, there are certain great trans-state roads that should be completed as military highways. This commission has in mind certain portions of Texas very rich in food production, notably East Texas, where the wastage in the field is very great on account of lack of road facilities. The commission also have in mind certain trans-state roads which, when completed, when military neces-

sities arise, could be used as great highways for transportation of troops and army supplies. We therefore respectfully suggest that in your next priority order you give priority for the construction, maintenance and repair of public highways that may be specifically designated by yourself upon the application of the highway department of any state. The commission will be pleased to have your views on this subject."

SEWERAGE AND SANITATION

State Control of Improvements.

St. Paul, Minn.—The state board of health has begun the enforcement of a rule recently passed to govern the construction of water-supply, sewerage and refuse-disposal systems. All plans for such improvements must be first submitted for revision and approval by the state board. According to the regulations "no system of water-supply, sewerage or refuse disposal for public use which affects or tends to affect public health shall be installed, nor shall any such existing system be materially altered or extended until complete plans and specifications for the installation, alteration or extension, together with such information as the state health board may require, have been submitted in duplicate and approved by the board so far as relates to their sanitary features. All construction shall take place in accordance with the plans as approved, whether with or without modification. Whenever any governing body of any municipality having charge thereof shall determine that there shall be any material change in the plans, construction or operation of any such system, such governing body shall submit to the state board of health, in duplicate, a detailed statement of such action on such contemplated changes before it shall enter upon the making of such changes or enter into any contract therefor or any part thereof, and then such changes shall be made only after approval as to all matters liable to affect public health, by the state board of health."

Health Conditions in Army Camps.

Washington, D. C.—Following is a detailed report on health conditions at all National Guard and National Army camps for the week ending November 9. The report to the surgeon-general of the army for that week, the last for which complete figures were available, states that: "Of the National Guard camps, those composing the troops from northern states show very much less sickness of a communicable nature. Extensive outbreaks of measles exist at Camp Sevier, Camp Wheeler, Camp Bowie and Camp Shelby. A considerable increase in measles cases is probable at other camps composed of recruits from southern states, viz., Camp Beauregard and Camp Doniphan. Thirty-four new cases of pneumonia were reported at Camp Wheeler and 39 at Camp Bowie. Eight cases of meningitis were reported from National Guard camps—Sevier, 2; Doniphan, 2; Kearny, 4. In the national army, as in the national guard, the camps composed of northern troops show much better health conditions than those whose personnel comes from southern states, with the exception of Camp Funston, where 24 new cases of pneumonia and 9 new cases of meningitis were reported during the week. Other communicable diseases have occurred at this camp—mumps, scarlet fever, diphtheria, small-pox and chicken-pox. At Camp Pike 683 cases of measles were reported and 76 cases of pneumonia. Camp Jackson, 370 cases of measles. All reports indicate that the type of measles is mild in character and that few complications are occurring among the cases. Mortality reported among pneumonia cases is also low. 'Cases of sickness' include all causes of excuse from duty, first reported during the week, for any indisposition or ailment whatever, except injuries, whether or not ordered to hospital. It includes a large proportion of cases for which, in civil life, the patient would not even consult a physician. All figures on sickness in these reports are of new cases first reported during the week ending Novmber 9. The totals and proportions given, therefore, are not of all on the sick list during the week. The military reports class the total number of sick and injured as 'total non-effectives' and the proportion of this total to the strength of a command as the 'non-effective rate.' The non-effective rate is usually higher than the weekly rate for new cases of sickness reported (the 'admission rate'), because individual cases of illness are, on the average, of more than one week's duration. The non-effective rate for the entire National Guard in th United States was, for November 9, 38.9 per thousand; the non-effective rate for the national army was 25.2 per thousand."

Reports on health conditions of the American expeditionary forces for the same week contain the following information: Annual admission rate per thousand—pneumonia, 16.6; dysentery, 2.0; malaria, 1.0; venereal disease, 181.5; typhoid, 0.0; paratyphoid, 0.0; measles, 27.1; meningitis, 1.0; scarlet fever, 1.9. The non-effective rate per thousand for November 12 was 31.6. The total of deaths for week ending November 9 was: for disease, 4; pneumonia, 3; heart disease, 1; from wounds received in action, 3; from accidental gunshot wound, 1. "The annual admission rate per thousand for a given disease" is defined as the ratio of new cases of that disease, which would be found per thousand men per year if the proportion continued throughout the year the same as during the period covered by the report.

Gas Explodes in Sewer.

New York, N. Y.—An explosion of gas in a sewer under Forty-second street near the East River tore up several yards of street, smashed the windows in houses for blocks around, stopped traffic on surface car lines and also in the Steinway tunnel to Long Island City, and injured one woman so badly that she was taken to a hospital. The explosion occurred just as the homeward-bound crowds were thronging the streets. The paving was torn up between the car tracks and for several hours the crosstown line was diverted to another route. The explosion also broke the roof of the Steinway tunnel so that traffic was suspended till a wrecking crew cleared away the debris.

Bond Issue Voted for Sewerage Improvements.

Johnstown, Pa.—Mayor Franke and the other city officials are much gratified at the passage of the $775,000 bond issue for sewer, garbage disposal and paving purposes by a vote of 2,025 to 1,623. Most of the issue, $500,000, is to be in 15 and 30 year bonds and will provide funds for a complete system of main and street sewers and also a disposal plant as ordered by the state board of health.

Milk Supply of Capital Deteriorates.

Washington, D. C.—There was an increase in the amount of low-grade milk and cream and watered milk sold in the District during the past fiscal year, according to the recent annual report of health officer William C. Woodward. He attributes it to the high cost of producing milk and to the high price for which it was sold during the year. "The greater the price of milk," declares the health officer, "the greater is the temptation to water and to skim it, since the returns thus obtained for every gallon of water added to milk or cream abstracted is greater. Another factor in leading to a deterioration of the milk supply of the District is probably the difficulty that has been experienced by the health department in enforcing the laws and regulations relating to milk." Under the legal entanglement holding up prosecutions which is now being unraveled in the courts, much milk and cream has been brought into the District from unknown sources, the report states, "and with a history that the vendors of such milk and cream prefer to conceal rather than disclose." Discussing the work of the bureau of sanitary inspection of the department, the report states that 42,651 sanitary inspections were made during the year. Violations of laws and regulations for the prevention and abatement of nuisances were reported in 11,885 instances, and compliance was procured in 11,366 instances; 233 informations charging violations of the sanitary laws and regulations were filed in police court. Fines and collaterals collected amounted to $64. Eight-hour law inspectors, whose work

comes under the jurisdiction of the health department, made a total of 11,140 inspections. Fines were imposed in nine cases, amounting to $160. The cost for enforcing this law for women during the year was $4,574.67.

Health Department Makes Tuberculosis Survey.

Boston, Mass.—The Boston health department is at present engaged in a tuberculosis survey of the city. This survey is calculated to disclose the actual number of known cases as well as the conditions in which they are to be found. It has been rendered necessary by the fact that present statistical information indicates a larger number of cases of recognized tuberculous condition in the city than actually exists, because the same case has often been reported at different times from different sources and from different addresses and not infrequently under different names. In connection with the survey a new system of checking and verifying reported cases has been put in operation to insure the accuracy of statistical information regarding this disease in the future. The reported cases in Boston from January 1 to October 1, 1917, number 2,392, but excluding the duplicates the actual number is 2,136. Up to the present time 8,000 visits have been made to pulmonary and laryngeal cases that are carried on the tuberculosis registry. A large number of visits is yet to be made, but the department expects that the results will amply repay the work.

Sanitary Regulation of Privies.

Alexandria, La.—The parish officials have passed the following resolution regulating the construction and sanitary maintenance of privies:

Every owner of property within the limits of the parish shall have at each dwelling and place of business a sanitary pail privy, or a septic tank privy, or a Kentucky sanitary privy, or a latrine on army plan approved by state board of health. A privy shall be considered sanitary when it has a fly-proof receptacle or vault, and when the seat has a self closing hinged lid so made and fitted as to prevent access of flies to the excrement. The receptacle shall be kept watertight, and one ceasing to be so must promptly be replaced by a sound one.

The floor shall be solid and watertight, covering the entire base of the building inside the walls. The roof of each privy or earth closet shall be watertight, and if sloped to the rear of the house it shall project not less than six inches beyond the rear of the house. The seat shall have a self-closing hinged cover over the box opening. That flies may be excluded the compartment under the seat in which stands the night soil container shall be tightly constructed of sound lumber without cracks or crevices. Any opening in this compartment for ventilation shall be screened with 18-mesh cross-wire per inch. The box, tub or can soil container shall be strongly constructed. It shall rest on the floor of the privy in such a position that its top shall not be more than one inch below the under surface of the closet seat. Whenever such box, tub or can container shall cease to be watertight it shall be replaced by a sound one.

There shall be at the back or side of each privy where containers are used an opening for the removal of the night soil container, which opening shall be provided with a tightly fitting let-down board, or 18-mesh cross-wire per inch cover, hinged to the house, and so constructed as to prevent the access of flies to the night soil. This cover shall be provided with a hook or button, and shall always be kept closed. Where practicable, the opening shall abut on a public alley so as to be readily accessible to the city scavenger.

In incorporated communities the board of councilmen shall have the power to fix a privy tax wherewith to maintain a salaried scavenger. This privy tax shall be payable monthly in advance to the town treasurer, or someone designated by the council to receive and dispense such money. The scavenger shall be hired on a salary by the councilmen, and shall be responsible to the town for efficient discharge of his duties as specified in the ordinance.

It shall be the duty of the scavenger to remove the excrement from each privy at least once a week; he shall remove and replace the receptacle with care to maintain the privies sanitary. He shall report to the councilmen or local health officer all privies that have not maintained a sanitary condition because of wear and tear or otherwise.

The material collected by the scavenger shall be disposed of by proper burying in a lot at some distance away from town. The use of such material as fertilizer is prohibited.

Where cesspools, septic tanks or Kentucky privies are used they shall not be allowed to overflow, or effluents from such pools or tanks shall not be discharged into running streams or disposed of by discharging into lines of tile drain laid below the surface of the ground.

Pit privies shall be constructed only in such places and in such manner as approved by representatives of the state or parish board of health.

Failure to comply with the above sections and all its provisions shall subject the offender to a fine of five dollars or imprisonment of five (5) days, and a fine of one dollar or imprisonment for each day after being notified that the privy remains in an unsanitary condition.

WATER SUPPLY

Whole Supply to Be Filtered.

Cleveland, O.—The entire city water supply will be filtered, beginning the early part of January, according to an announcement by water commissioner Dusinberre. He said that the present pumpage of 8,000,000 gallons in twenty-four hours would be increased in about six weeks, and that three-fourths of the plant facilities, with a capacity to pump about 100,000,000 gallons daily, would be put in operation shortly after that. This quantity, Mr. Dusinberre explained, is equivalent to the present city water needs. The 8,000,000 gallons now being filtered daily, according to the water commissioner, are being pumped to test the plant apparatus and to lay the foundation for a working organization at the plant. "The chief problem now is to work up an organization," said Mr. Dusinberre. "We have ten men working at the plant, and this staff will be increased to about sixty when the entire city is supplied with filtered water. At present, the water that is filtered is mixed with the unfiltered product, as there is no provision for sending it separately through the mains."

Water Supply in Serious Condition.

Hamilton, O.—The water situation in Hamilton has been growing more serious for several weeks. With only fourteen feet of water in the reservoir the pumps were unable to get any water from the wells. Manufacturers using city water were cut off for a day and consumers were urged to be as economical as possible. Fire chief William Dowty said that if a big fire should break out and it would be necessary to use six or eight streams, the water supply would not last very long. Mayor Holzberger said that he has been trying for months to get some action to better conditions at the water works. He said that as far back as Feb. 13, 1917, he had named committees of citizens to look into all of the needs of the city plants. He said these committees had met several times but that council failed to cooperate. The head of the water supply has been steadily going down, the mayor said. In his judgment the wells are in a wrong location and he would like to see a new station secured. Meanwhile the consulting engineers, Mead and Seastone, have reported on plans for the improvement of the supply and steps are being taken to start construction work as soon as possible. The report of the engineers estimates that it would cost $89,455 to place the distribution system alone in first class condition, in which case fire protection would be ample. It proposes the laying of several new mains. The report continues: "From what has been stated regarding the condition of the present well system, the draft on the ground water and the consequent lowering of the ground water level, it is apparent that immediate steps should be taken to relieve the situation and increase the available supply. The inadequacy of the yield has been fully appreciated by those in charge of the system for some time." These recommendations in brief are: To construct three new ten-inch wells and connect them with the present system, and to construct a new suction pipe at the elevation of the pump in the booster well. As arranged at present the suction pipe is about 9 feet higher than the booster pump and acts, the report says, as a syphon, and if the water level would not in the future continue to drop, a new suction line might be constructed on the same lines as the present one, but the lowering of the level is liable to continue and therefore a new suction line should be constructed at the same elevation as the pumps at the booster station, dropping slightly toward the north end to insure the absence of air pockets. The three 10-inch wells should, of course, be provided with independent valves and screens of adequate length and be laid out on lines that will insure the maximum efficiency as well as the minimized cost of upkeep, and the present wells should be connected with the new suction so that any or all of them may at any time be discontinued if desired." The report says that careful estimates of the cost of this work as made nearly six months ago was $16,430. Since that time costs have risen and to take care of this increase

and other emergencies council has placed $18,000 in the water works fund. A few days after the submission of this report, health officer A. L. Smedley published the following warning: "The city water is contaminated and dangerous to drink wtihout being boiled. A chlorination plant has been ordered by telegraph. It will take two or three days to install it. Until that time it is dangerous to drink city water without first boiling it to avoid typhoid fever epidemic. Due notice will be given when the water is safe to use without boiling."

Commission Sets Rates for Municipal Plant.

Bangor, Me.—The new water rates to be charged to consumers in this city have been ordered by the public utilities commission, according to secretary Walter I. Brown of the Bangor board. In some of the items, the local board did not wish to make a charge, as, for instance, automatic sprinklers, which were held by many to be a benefit to the city as an extension of the fire department system rather than a service to be charged for. However, the commission decided that the charge must be made, and the Bangor board obeys. The new rates do not vary much from those that have prevailed since 1893, Mr. Brown said. They will make consumers who receive more water pay more, and will reduce the rates to those who use less. To householders the rates will be about the same, except that those who have hot water heating systems must pay 40 cents a year for that service, a merely nominal fee. For those who have steam heating plants in their homes the fee will be $1 a year. There has been no charge for this in the past. Mr. Brown says that there is to be no fee service at all in the future. For two tenement houses the rate is slightly less. The first faucet will be $2 instead of $3. Each washbowl in a private home will cost $1 hereafter. Formerly the first two were $1 each, and the next five 50 cents each. The rates to bakeries are changed so that the larger firms will now pay more, and the smaller concerns, using less water, will not have to pay so much. Rates to barber shops, circuses and restaurants are practically the same. Mr. Brown says that the Bangor rate for automatic sprinklers is probably the lowest in the whole country. Rates for hose to householders remain the same. Greenhouse owners now pay according to the number of openings rather than on the elastic schedule that formerly prevailed. Rates for steam boilers are now based on the square area of the grate. Set wash boilers are 50 cents, half the former rates. Churches now pay only half the rate formerly paid.

STREET LIGHTING AND POWER

Advertising Sign Economy.

Washington, D. C.—The cities have already become accustomed to the absence during part of the evening of illuminated advertising signs, the operation of which was limited by a recent order of the United State Fuel Administration. The order says: "The use of coal for any of the purposes hereinafter described, except to the extent hereinafter indicated, is wasteful, and any person using any coal for such purposes is engaging in a wasteful practice or device in handling or dealing with coal, and that the use of coal for such purposes is prejudicial and injurious to the national security and defense, and a cause of scarcity, locally and generally." No electricity shall be furnished or used which is "generated or produced, in whole or in part, by the consumption of coal, for the purpose of providing, maintaining, lighting or operating, before the hour of 7.45 p. m., or after the hour of 11 p. m., electrically illuminated or display advertisements, notices, announcements, signs, designation of the location of an office or place of business or of the nature of any business, electric searchlights, or (external) illumination or ornamentation of any building, except as in special cases hereinafter further or otherwise provided or limited, namely: (a) This order shall not apply to the United States Government, the government of any commonwealth or state of the United States, or to any city, county, town, or other governmental subdivision in any such commonwealth or state. (b) This order shall not apply to the maintenance of street lights by any city or town or within any city or town under a contract with the officials thereof for such maintenance, or to the maintenance of any lights for any purpose by, or in compliance with orders of, any public authorities. (c) Electric signs affixed to the street fronts of buildings over the street entrances thereof or over the street entrances to stores, shops or other places of business therein, or extending therefrom over the sidewalks, for the purpose of announcing the name or business of a retail shop or store, or the name and location of a theatre or other place of amusement or of a hall or other place of public assembly, together with the name of the play or other entertainment given therein, or of the purpose of any public assembly to be held therein, as the case may be, may be lighted or illuminated or operated by electricity, generated or produced by the use of coal, during the period from one-half hour after sunset until such time, not later than 11 o'clock in the evening, at which time, in the case of a place of business, the same is closed for the conduct of business therein in the same manner and to the extent that such business is conducted therein during the daytime business hours, and in the case of places of amusement and public assembly heretofore referred to until one-half hour after the time fixed for the beginning of an entertainment or of the meeting or other public assembly, as the case may be: Provided, That the size of any such sign and the amount of electricity needed to operate and illuminate the same shall be reduced at any time upon direction of the state fuel administrator of the state within which such sign is located. (d) This order shall not apply to porch lights upon houses or hotels or at the entrances to buildings occupied or open for ingress or egress during the night time, or to lights upon private driveways, walks, or in the grounds of any hotel, manufacturing establishment, or residence, or upon the platform of railroad stations, approaches thereto, or in railroad yards or grounds, or to lights to mark the location of fire escapes or exits; or to lights for any similar purposes when authorized by any state fuel administrator of the state within which such lights are located: Provided, however, That the number and power of any such lights, by this paragraph (d) permitted, shall be reduced at any time upon direction of the state fuel administrator of the state within which such buildings or grounds are located. (e) Nothing herein shall be construed to extend the length of time, fixed by agreement or otherwise, between any person and a state fuel administrator, for which any such sign or illumination may be displayed or operated. The state fuel administrators within the several states are hereby directed and authorized to see that the provisions of this order are observed and carried out within their several states, to report violations thereof to the United States fuel administrator, and to recommend to the United States fuel adminisrator action to be taken by him with respect to the sale, shipment, distribution, and apportionment of coal to the corporations, associations, partnerships, or persons so found to be acting in violation of this order."

Dismiss Heat Unit Reduction Plea.

Indianapolis, Ind.—The public service commission has dismissed the petition filed by the Indiana Gas association several months ago, asking for permission to reduce the standard of heat units in gas from 600 British thermal units to 550. The association is composed of all of the gas companies doing business in the state. It is evident that the companies wished to reduce the heat units of their gas in order that they might extract from it certain chemical elements that go to make explosive materials. This, of course, meant an added income for the companies-but they asked that they be permitted to make this change without reducing the cost of their gas to the consumer. Shortly after the petition was filed, a conference was called by the Government bureau of standards at Washington, and one of the subjects considered was the standard of heat units for gas. Representatives of gas companies over the country insisted at that conference that the heat units might be reduced without detriment to the gas, and they

sought to show that it would be all right to make such a change. Members of several public service commissions over the country opposed this proposition, however, and laid down the proposition that while there might not be serious complaint against the idea of reducing the heat units this must not be done unless the gas companies reduced their gas rates accordingly. For instance, it was pointed out, if gas at 600 heat units sells for 90 cents a thousand, it should sell at 75 cents a thousand if the heat units are reduced to 500. It would be unfair, it was held, to permit gas companies to make the reduction in the standard quality of their gas and at the same time permit the companies to continue to charge the same old price. Since that conference was held the gas companies apparently have reached the conclusion that there should be no objection on their part to the dismissal of the petition by the public service commission. Every gas company in Indiana was interested in the petition, for if it had been granted every company would have had the right to make the change in heat unit standards. From the start, the petition was regarded as a movement on the part of the companies to bring about, indirectly, an increase in rates.

City Wins in Gas Rate Case.

San Francisco, Cal.—The railroad commission has settled the fight between the city and the Pacific Gas and Electric Company in a decision fixing the future rates for gas in San Francisco at a maximum of 85 cents a thousand. The company had sought to charge a top price of $1. The new schedule follows: First 10,000 cubic feet a meter a month, 85 cents a thousand; next 20,000 feet, 80 cents; next 40,000 feet, 75 cents; next 80,000 feet, 70 cents; next 150,000 feet, 60 cents. In apartment houses where at least four meters are continuously served from one service and in one location the minimum monthly meter charge will be 35 cents. Other meters will have a minimum charge of 50 cents a month. The changes in schedule make a slight reduction in charge for customers using more than 10,000 feet a month, with the exception of the heaviest users, who will be forced to pay a slightly increased rate. The decision of the commission constitutes a complete victory for the city, according to assistant city attorney John J. Daly, who said that the big point of the fight was that the commission had placed a permanent low rate on gas despite the fact that the price of crude oil is continually advancing. "Where the company had a contract price of 68½ cents for crude oil a few years ago," he said, "they are now paying $1.30 and $1.40." After a study of the valuation of properties, the increased price of oil, enlarged payroll and other factors of expense of the company, the commission fixed a rate base on which it established rates, allowing the company an income of approximately 8 per cent. This rate base, which is less than that submitted by the company, was put at $14,042,050. It represents the commission's invoice of the company's properties. The commission fixed the operating expenses of the company at $2,472,966 a year and the depreciation of equipment at $259,550. According to commissioner Devlin, the analysis made by the commission was very exhaustive. "We even had a study of the money market made," he said, "in order to determine how much it cost to get funds for the operation of the P. G. and E." In its investigation the commission found that the company had recently raised the pay of its employes a total of $24,000 a year. The city still is carrying on litigation against the company in the federal courts, but Daly considers this decision of more importance, as it affects the future rates, while the matter before the master in chancery is a dispute over the rates charged in the years 1913 to 1917. Commissioner Devlin explained that the reason the commission fixed a rate base less than that submitted by the company was due largely to the fact that certain duplications of properties and pipe lines, which the company had obtained from corporations now subsidiary to it, were omitted. According to Daly, a variation of $40,000 in the cost of producing gas means a variation of 1 cent in the rate necessary to cover it. For that reason, with bounding cost of production, the city feels that it has achieved a marked victory in the railroad commission's decision barring increased rates.

Following this San Francisco decision, concerted action by the cities, other than San Francisco, that are served with gas by the Pacific Gas and Electric Company was planned for the coming gas rate hearing before the railroad commission by representatives of twenty-nine of the forty cities included in the application of the gas company for an increased rate. Called by the League of California Municipalities, city attorneys from the near-by communities, and as far north as Chico and as far south as Fresno, met and appointed the following committee to arrange a plan for co-operation in securing a rate expert and possibly special counsel, to attend all the hearings and assist the local officers of each of the cities: Wallace Rutherford, chairman; A. F. St. Sure, Alameda; D. J. Hall, Richmond; Thomas H. Reed, San Jose; W. J. Locke, secretary of the league. The rates now in effect range from 90 cents upward, and the gas company has filed an application with the railroad commission for an increase by reason of the increased cost of oil and labor. It was urged that in combining for the employment of a gas engineer, or gas rate expert, the position of each of the cities would be strengthened. Among the communities represented were: Oakland, Berkeley, Alameda, San Bruno, Redwood City, San Leandro, Petaluma, Ross, Hillsboro, San Anselmo, Santa Rosa, San Mateo, Richmond, Sebastopol, Burlingame, South San Francisco, Fresno, Daly City, Oroville, Colusa, Woodland, Marysville, Los Gatos, Chico, Albany, Vallejo, San Jose, San Rafael and Napa.

FIRE AND POLICE

Law to Stop Bomb Plots.

Washington, D. C.—The recent order of the Bureau of Mines that any person found with explosives in his possession and who does not have a license issued by the Federal Government showing the purpose for which the explosives are to be used, will be arrested at once, is now in effect. The penalty is a fine of $5,000, or one year in prison, or both. This is the principal clause in a war measure passed by the last Congress, which is now being put into effect by the Bureau of Mines, Department of the Interior. Francis S. Peabody, of Chicago, a coal operator familiar with the use of explosives, has been appointed to act as assistant to the director of the Bureau of Mines, Van H. Manning, in the enforcement of the law. The director of the bureau is empowered to utilize the services of all United States officers and all police officers of the states, including the city police forces, county sheriffs, deputies, constables, and all officers in any way charged with police duties. The police of the cities have already been organized for this work, headed by a committee of chiefs of police in the big cities, of which Major R. W. Pullman, superintendent of police of Washington, is chairman. The police are not only to look after the enforcement of the law, but are also to make thorough investigations of all dynamite outrages and fires in factories and warehouses, and to make their reports to the director of the Bureau of Mines. Persons apprehended in plots to blow up factories and bridges will be turned over to the authorities for prosecution under federal or state laws. Most states have specially severe punishments for these crimes. New York has an extreme penalty of twenty-five years' imprisonment for the placing of dynamite with intent to blow up property. The penalty provided in the federal measure is merely to cover the illegal possession of explosives. The law provides that every one who handles explosives must have a license. The manufacturer, the importer, and the exporter must have licenses issued by the Bureau of Mines. The seller of explosives and the purchaser of explosives must also have licenses, these to be issued generally by county clerks or other local officers who are authorized to administer oaths. There will be at least one licensing officer in each county and more agents will be designated if the county is sufficiently large to warrant it. If a state has laws providing for a system of licensing persons manufacturing, storing, selling, or using explosives the state officials authorized to issue such licenses shall be designated as federal licensing

agents; also city officials qualified to issue city explosives licenses will be authorized to issue federal licenses. A federal license will not relieve any person from obtaining a license required under state laws and local ordinances. In each state there will be appointed a state explosive inspector, who will represent the Bureau of Mines in the administration of the law within the state. Only citizens of the United States or of countries friendly to the United States and the Allies may so obtain licenses. Contractors, mining companies, quarrymen, and others using large quantities of explosives which are handled by employes may issue explosives to such employes only as have licenses. The purchaser of dynamite, in obtaining a license, must state definitely what the explosive is to be used for, and will be held accountable for its use as stated and the return of any explosives that may be left. With the strict enforcement of this law the federal authorities hope to put a stop to all further dynamite plots.

Fireman Injured at Church Fire.

Norwalk, Conn.—The First Congregational church here was completely destroyed by a fire which also menaced St. Paul's Episcopal church and several adjacent dwellings and that caused a loss of $75,000, which is partially covered by insurance. The fire was caused by the explosion of a tinner's torch, in the steeple over the belfry, and spread rapidly. The spire fell into the roadway, and the flames spread to the main building. The 3,000-pound bell fell into the ruins shortly afterward, and the flying debris struck and injured Oscar Waleur, a fireman, who was taken to the hospital unconscious. An hour later the roof collapsed, leaving only the four walls standing. The fire was under control soon afterward. The church was built in 1816, and the bell formerly hung in the steeple of the old church. A new $12,000 organ installed the week before was destroyed by the flames and water. The steeple had been under process of repair, having been struck by lightning some time ago. One reason for the spread of the fire was the inability of the firemen to get water into the steeple, where the blaze originated.

Vote for Abolition of Segregated District.

Shreveport, La.—After a stirring campaign, the voters at a special election have approved the ordinance abolishing the segregated district by a vote of 1,376 to 642. The work of the Anti-Vice commission was secretly opposed by the vice interests, who used all sorts of methods to stop the opposition. Its last effort prior to election day activities was the distribution of the following anonymous circular throughout the city: "Notice to Property Owners, Renters and Voters: Keep the lewd woman where she is. Your mother, sister, wife and little children won't have to rub elbows with lewd women if you vote to keep her where she is. Scatter them over the city and you can't stop them. All this dope of the hired so-called vice experts does not mean anything to the small renter and home owner. Citizens' Committee." The anti-vice commission is confident that the vote in favor of abolishing the district would have been larger than it was had the ballots been printed in more definite form. Owing to the ambiguous wording of the ballots, many people voted against eliminating the district, when they thought they were voting for it, the commission declared, and vice versa. Discussion of measures to continue the work against the social evil, to prevent "scatteration" and clandestine violations of the ordinance were begun immediately after the results of the election became known. The anti-vice committee appointed by the Rotary Club last June made its final report and was followed immediately by the creation of a morals commission to be constituted as the anti-vice commission, of which the Rotary committee was the nucleus. Representatives of all the civic organizations, women's clubs, churches, business clubs, etc., will be invited to participate in the organization of the commission and in the preparation of a program of activities to counteract what follows in the wake of the elimination of the district. While the movement against the district originated with the Rotary Club, that organization was by no means alone in carrying out its program. The Lions Club, Ad Club, women's clubs, the churches, practically every organization and influence having the welfare of the city at heart, accepted with alacrity the Rotary Club's invitation to join in the work. The movement for the elimination of the district began with the Rotary Club early in June, shortly after Shreveport had made and lost its bid for one of the national army training cantonments. Several of the most enthusiastic workers in this project decided that if the elimination of vice districts in the vicinity of the training camps as put into effect by the United States was good for the soldiers it was good for the civilian population, the younger boys and the girls of the community. The committee took the matter up with the legislature, where it met but cool reception until the Caddo delegation got behind the effort and did what it could to have enacted a measure abolishing restricted districts throughout the state and in Shreveport in particular. But the proposed law died and the committee then began the campaign in Shreveport. The city council declined to take the initiative in abolishing the district and a referendum election was asked by the Rotary Club, which issued an invitation to all other organizations of the city to join it in the housecleaning. The response was general throughout the city and many resolutions endorsing the movement were adopted by various bodies in other towns in the vicinity. The ordinance is already in effect, but the women of the district will be given ample time to get out.

Out-of-Town Apparatus Called to Business Section.

New Rochelle, N. Y.—Damage estimated at more than $250,000 was caused by a fire which started in the cellar and destroyed several big office buildings and a number of private residences. The fire started about 2.30 o'clock in the morning. Fanned by the high wind the flames spread rapidly through the building, the first floor of which was occupied by a number of small stores and the upper floors by a furniture storage concern. Within half an hour the bank next to it was burning, and before long the sparks had been carried to the Central Hotel across the street, where a dozen guests had narrow escapes when the building caught fire. Fire chief James Ross turned in a general alarm, summoning apparatus from all the New Rochelle stations, which was quickly followed by an out-of-town call. This brought apparatus from Larchmont, Mount Vernon and Pelham. By the time the out-of-town firemen arrived the blaze had spread through several small stores and office buildings over to Main street, a block away, and was endangering the city hall, with its historic records of the Huguenot city. Only the walls of the bank remain standing. The Downey building, where the fire started, has been totally destroyed and a number of other buildings wrecked. Frame houses more than a quarter of a mile away were set ablaze by sparks, and as much apparatus as could be spared from the business section was rushed to the scene. Firemen were able to save only two out of the seven dwelling places that had caught fire from the sparks. It was almost 7 o'clock before chief Ross reported that the fire was under control. Several firemen had narrow escapes in fighting the blaze.

MOTOR VEHICLES

Canadian City's New Equipment Does Well.

Sydney, N. S.—At a test of the new American-La France motor pumper at Ingraham's Wharf, with a thirteen-foot lift the pumps forced three hundred and fifty gallons of water through a single line of hose and threw a stream of water to a distance of between seventy-five and one hundred yards. With a nozzle turned upward the stream rose to a height of fully one hundred feet. The motor truck has an engine of 105 horsepower, six cylinder. The wheel base is 156¾ inches and the tender is equipped with Dayton airless tires. The motor truck carries 1,200 feet of hose and two three-gallon hand extinguishers. It has two ten-inch headlights and one ten-inch searchlight. The pump's capacity is 350 gallons per minute, and the truck carries a supply of fifteen gallons of gasoline and will travel at the rate of fifty-two miles per hour. An important feature is the partition which runs

along the center of body from back to front. This enables the hose to be rolled with both ends out so that either can be used accordingly, as the engine comes first to the fire or the hydrant. A second test was later carried out with the engine pumping from a hydrant, in which the engine did as well as in the first. The fire department expects the arrival of a ladder truck within a month or so. This will enable the department to dispense entirely with horses.

New Fire Truck Accepted.

Provo, Utah.—At a meeting of the city commission the triple combination fire truck, purchased from the American-La France Fire Engine Company, at a cost of $8,500, was accepted. Fire chief Jos. W. Loveless reported that it had been tested and found very satisfactory.

Test of New Fire Auto Meets Approval.

Oswego, N. Y.—The official tests of the new motor-driven fire apparatus purchased by the city from the American-La France Engine Company of Elmira were in charge of chief engineer Joseph Hennessey and engineer William O'Connell, for the city, and George Morley and Messrs. Bruce and Teeter for the company, and hydraulic engineers R. D. Woods and S. T. Lewis, of Syracuse, representing the State Board of Underwriters. President Scheutzow and commissioner Kehoe, of the department of fire and police, and former chief Robert Blackburn were among the spectators. Chief Hennessey, engineer O'Connell and the representatives from the State Board of Underwriters, after watching the work for half an hour, said that there was no doubt in their minds but that the machines would meet all the requirements of the specifications. When the gauge was placed on the hydrant it showed a pressure of only fifteen pounds, throwing an indifferent stream of less than thirty feet. The engine was then attached and there was developed a pressure of 150 pounds, throwing a splendid stream. The engine will solve the lack of pressure in the Oak Hill district, so long complained of by residents there.

GOVERNMENT AND FINANCE

Big Majority for City Manager Charter.

Norfolk, Va.—Exceeding even the most liberal estimates of its advocates, Norfolk's new charter swept the city at the recent special election, its opponents being snowed under by a majority of 2,181. The leaders of the opposition, without a single exception, lost their own wards and precincts, only the smallest of the five wards in the city giving a majority against the charter. The charter received 3,403 votes, and the opposition 1,222. There were 61 void ballots. The success of the charter is attributed to the carefully planned and perfectly executed campaign of the Citizens' Union. All parties and factions were represented in the ranks of the union, and every legitimate method was employed to educate the voters as to the form of government proposed, and to get the vote to the polls. The efforts of the opposition to make an issue of the negro question fell flat. The eleventh hour announcement of the opposition that negroes and whites attended the same schools in Dayton, Ohio, which has a commission-manager form of government similar to that provided by the Norfolk charter, was combatted by the Citizens' Union by publication of the announcement that Ohio schools operate under State law, and have no connection with the city charter in so far as the condition bemoaned by the antis is concerned. The campaign was marked by strong organization on both sides and carried out in numerous meetings and street corner speeches. "Reason-why" advertising was used in the newspapers by both sides. The new charter will not become a law until passed by the General Assembly at its next session. After being ratified by the Legislature, it will not become operative until September 1, 1918, but the five members of the council will be elected the second Tuesday in June, 1918, this giving ample time for the selection of a city manager. The question has been raised as to the right of the Legislature to amend any provision of the charter. The concensus of opinion appears to be, however, that no change can be made in the charter except by vote of the people. The possibility of active opposition to the charter in the Legislature appears to be very remote. On June 19, by a great majority, the people of Norfolk went on record as favoring a change in the city government, and elected a commission of nine of the prominent and able men to frame a charter. This commission was composed of Tazewell Taylor, chairman; John E. Burke, Hugh L. Butler, W. Taylor Ham, C. H. Hix, John S. Jenkins, R. W. Peatross, Albert L. Roper and H. H. Rumble. The charter adopted provides for a council of five, one member of which is to act as president and as mayor for all ceremonial purposes. This council is to elect a city manager, whose salary is to be fixed by the council. The manager may be selected from outside the city of Norfolk, and is to hold office at the pleasure of the council, but cannot be removed for one year after taking office. The initiative, referendum and recall are incorporated in the charter and the city departments are placed under civil service. The city manager is not subject to recall, but is answerable to the council, and any member, or the entire council, may be recalled. The Democratic primary is eliminated by the charter in so far as the members of the council are concerned, but in no other instance. Candidates of the council are to be nominated by petition, signed by not less than 250 qualified voters. The name of no candidate for the council nominated in a primary or in a party caucus can be placed on the official ballot.

Increased Pay for City Workers.

Columbus, O.—The city council has passed an ordinance raising salaries of laborers and teamsters in the city employ from $2.50 to $2.75 per day. About 340 laborers and 125 teamsters will benefit by the increase. Abnormal living conditions caused the raise.

Stop Banking of City Cash in Private Accounts.

Atlantic City, N. J.—Employees of the city who have anything to do with the collecting or receiving of city moneys and who have been in the habit of depositing such funds to their own personal accounts because the sums were small and holding them until a sizable amount was on hand and then turning it over to the city, will not be able to do that in the future. They will have to make their deposits as soon as the moneys have been received. Nor will they be permitted to withdraw any of the city funds except by check or draft, which shall be countersigned by the city treasurer. A resolution covering these matters was offered by finance director Beyer to the city commission. According to the resolution: "Sums due the city government must not be deposited to the personal account of any officer or employee collecting such money, but be deposited in the name of Atlantic City, accompanied by words designating the official capacity or employment of such depositor, and that no such funds, or any part thereof, shall be withdrawn from the depository except by check or draft signed by such official or employee and countersigned or approved by the city treasurer. Further, all accounts now not so deposited shall be so deposited within ten days from the date of this resolution, and that a copy of this resolution shall be furnished each bank and trust company in Atlantic City. This, however, shall not apply to the sinking fund commission of Atlantic City."

MISCELLANEOUS

Air Highways to Cover the County.

New York, N. Y.—Plans for forming four transcontinental arteries for air traffic have been approved by the executive committee of the Aero Club of America after a thorough survey of the situation. The club's committee on landing places, of which rear-admiral Robert E. Peary is chairman, has been instructed to make all possible speed in charting the routes and selecting places. The cities named on the routes will be asked to plan and provide proper landing stations. Under the club's plan the

airways would be named the "Woodrow Wilson," "The Wright Brothers," "The Langley" and the "Chanute and Bell." The first would be charted from New York to San Francisco, touching Cleveland, Toledo, Chicago, and other important cities. The second would start from Washington, running through Virginia, North Carolina, the state in which the Wright brothers made their historic first flight, Georgia, Alabama, Mississippi, Louisiana, Texas, with a station at San Antonio, where an airplane was used for the first time in history under conditions approximating warfare, then through New Mexico and Arizona and ending at San Diego, Cal. The Langley airway, although definite plans have not yet been made, would run from Washington to Los Angeles. The Chanute and Bell airway, named in honor of Octave Chanute and Alexander Graham Bell, would run from Boston to Seattle, touching Albany, Syracuse, Rochester, Buffalo, Erie, Detroit, Grand Rapids, Michigan, Minneapolis, Bismarck, N. D., Great Falls, Mont., and other cities. North and south airways, under the club's plan, would be charted from Bangor, Me., to Key West, Fla.; Puget sound to San Diego, Cal.; while an airway to be called the "Gulf" would extend from Key West to the mouth of the Rio Grande, touching every important city on the Gulf of Mexico. These airways in time would be crossed by hundreds of smaller charted routes, so that the country, as air navigation develops, would become a vast network of routes, laid out with much precision and care as the thousands of charted sea routes. "The early putting of this plan into effect," the club's announcement said, "would give practice in flying to thousands of men upon whom the army and navy could draw as fast as they need them. As the work of flying across the country and dropping mail bags is identical with the work of bomb dropping aviators they would get practical training and the aerial mail service would become a practical training school for military aviators."

City Plan Provides Air Highway Stations.

Syracuse, N. Y.—Syracuse will be one of the landing stations on the "Chanute and Bell" aerial highway from coast to coast, the northern one of four selected routes announced by the Aero Club of America. The city is prepared, to the extent that plans are ready for immediate execution, to provide facilities for airplane traffic. Clarence E. Howard, consulting architect for the City Planning Commission, many weeks before, made public comprehensive, finished plans for an airdrome and four landing places, with all the equipment necessary for the accommodation of air travel. Mr. Howard has designed four public landing stages for airplanes, a station for hydroplanes and a great airdrome for repairs, storage, manufacture and training, as follows: East station—Lock square; West station—Burnet park; North station—east shore of Lake Onondaga; South station—Midland avenue; hydroplane station—Lake Onondaga, near airdrome; airdrome—between fair grounds and lake. The report says: "Building and repairing will be carried on at a great airdrome to be established close to the fair grounds, on the filled land between that reservation and the lake. Here is already available an area 1,000 feet wide by 2,500 feet long, flat as a ball room floor and provided with all needed means of transportation. In addition there will soon be a fill which will add nearly 1,000 acres. The hydroplane station will be on the airdrome shore of the lake. Plans are already under way for a system of shops for repairs and manufacture of new machines, or hangars to provide shelter for a fleet or for individual machines. It is also proposed to create on this area a flying school to train young men of Syracuse who wish to become flyers. The airdrome area is, of course, far larger than will be necessary at any of the other landing places. The Lock square station, the eastern terminus, will start, probably, with a width of about 400 feet and a length of 800. There is provision for a considerable extension in length if that is found necessary. It is likely the other landing stages will conform to the original plans for the Lock square station. All of the land proposed for conversion to air traffic purposes is either in possession of the public authorities or held under agreement with them. Whatever additional land is necessary is obtainable at a low price. Thus, literally, the groundwork is done. It is impossible as yet to know all of the details which time will determine as necessary equipment of these landing stages. Some progress has been made even along this line, however. Take the matter of designating the landing stages by night and by day, for instance.

By day the stages will be marked by wide margins of concrete, painted white, or white and black. Roofs of certain buildings can be utilized for aerial sign posts along the general air routes. Where these are unavailable, the government, either federal or state, will erect distinguishing marks at proper intervals. This will be necessary because with the development of air traffic will come a drifting away of the flying custom of following water routes both because of the level ground to be found along streams and because the ribbon of water offers a sure guide to the airmen.

By night it is proposed to indicate the landing stages in a novel way. There must, of course, be a sufficiency of light not only to designate the landing stage at a distance, but to provide illumination for the process of landing itself. It is suggested, therefore, that wells be sunk at each corner of the stage. In these wells powerful searchlights will be placed with their beams aimed straight at the heavens. These shafts of light, extending hundreds of feet into the sky, will prove a never failing guide to the wandering airman, and also will illuminate the landing stage itself. Being beneath the level of the ground there will be no diffusion of the glare to confuse the flyer.

It will also be necessary to provide colored signal lights of high power to indicate the number and name of the state, and to inform the flyer when and how he may drop to earth. It also probably will be necessary to have some sort of an aerial patrol either stationary or in moving planes, for purposes of policing the air and for guidance. Both systems may be used, in fact. One may even expect to see the aerial pilot planes skimming about, awaiting the arrival of the liners of the air. In bad weather lights may be raised to enormous heights by means of kites or balloons so that airmen above the clouds may find their course despite the mists beneath them.

In the accompanying illustration the stars indicate landing places, while the circle circumscribes the "barred zone."

City Sells Potatoes to Charitable Organizations.

Columbus, O.—The board of purchase is selling approximately 800 bushels of potatoes, raised on the workhouse farm, to a group of charitable organizations of the city. A price of $1.25 a bushel has been fixed. Representatives of a number of these organizations attended a board meeting and offered to take the potatoes at this price. According to the plan the potatoes are to be distributed among the headquarters of the various organizations and from there sold and delivered to worthy families.

Vote For Grade Crossing Subway.

Ashtabula, O.—The proposition to issue $140,000 bonds for the construction of Center street subway was approved by vote of 2,285 to 836, giving a safe margin over the required two-thirds. In only one of the seventeen city precincts was the vote against the proposal. The question has been agitated for a number of years, particularly after a disastrous accident about five years ago. The grade crossing will be eliminated at the dangerous point and a subway constructed.

AEROPLANES IN CITY PLAN OF SYRACUSE.

NEWS OF THE SOCIETIES

Calendar of Meetings.

Nov. 25-Dec. 1.—ATLANTIC DEEPER WATERWAYS ASSOCIATION. Annual convention, Miami, Fla. Secretary, W. H. Schoff, Crozer Building, Philadelphia, Pa.

Dec. 6, 7.—ILLINOIS MUNICIPAL LEAGUE. Annual convention, University of Illinois, Champaign and Urbana, Ill. Secretary, John A. Fairlie.

Dec. 4-6.—AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS. Annual meeting, Richmond, Va. Acting secretary, H. M. Berry, Chapel Hill, N. C.

Dec. 26-29.—AMERICAN POLITICAL SCIENCE ASSOCIATION. Annual meeting, Philadelphia, Pa. Secretary, Clinton J. Swartz, Trenton, N. J.

Dec. 27-29.—AMERICAN SOCIOLOGICAL SOCIETY. Annual meeting, Philadelphia, Pa. Secretary, Scott E. W. Bedford University of Chicago, Chicago, Ill.

Jan. 3, 4.—NEW JERSEY STATE LEAGUE OF MUNICIPALITIES. Annual convention, Trenton, N. J. Secretary, Clinton A. Swartz, Trenton, N. J.

Jan. 15-17.—VIRGINIA GOOD ROADS ASSOCIATION. Seventh annual convention, Richmond, Va. Secretary, C. B. Scott, Richmond, Va.

Feb. 6-13.—FIRST CHICAGO CEMENT MACHINERY AND BUILDING SHOW. Supersedes annual Chicago Cement Show. Held at the Coliseum, under direction of the National Exhibition Co.

March 17-24.—PAN-AMERICAN CONGRESS ON CHILD WELFARE, Montevideo, Uruguay. Secretary, Edward N. Clopper, 105 East 22d Street, New York, N. Y.

American Association of State Highway Officials

The annual meeting of this association will be held at Richmond, Va., December 4, 5 and 6. The program has been arranged as follows:

Tuesday, December 4.

9:00-10:00 a. m. Registration of delegates.

10:00 a. m. President's annual address—G. P. Coleman, of Virginia.—Present Conditions Affecting Road Construction and Measures Taken to Meet Them. (a) In the East—W. D. Uhler, of Pennsylvania. (b) In the Central West—S. E. Bradt, of Illinois. (c) In the South—W. S. Keller, of Alabama. (d) In the far West—General discussion.

2:30 p. m. Car Shortage, Present Conditions, and the Remedy—Charles M. Upham, of Delaware. Discussion—F. F. Rogers, of Michigan, and Clinton Cowan, of Ohio. General discussion. Military Roads, Why and Where—Wm. D. Sohier, of Massachusetts. Discussion—W. F. Cocke, of Florida, Geo. A. Duren, of Texas, and Rodman Wiley, of Kentucky. General discussion. Appointment of committees.

8:00 p. m. Theatre party, arranged by entertainment committee.

Wednesday, December 5.

W. D. Uhler, of Pennsylvania, presiding. 9.30 a. m. One Year's Experience with the Federal Aid Road Law—Logan Waller Page, Director U. S. Office of Public Roads.

The United States Office of Public Roads has arranged to have a representative present who will discuss briefly the requirements of the Secretary of Agriculture under the following heads. After taking up each topic, questions and general discussion will be entertained. (a) Project Statements. (b) Mail Routes. (c) Permissible Types of Constructions. (d) Surveys and Plans. (e) Estimates and Specifications. (f) Project Agreements. (g) Lettings and Contracts. (h) Construction and Inspection. (i) Convict Labor and Force Account Work. (j) Monthly and Final Estimates. (k) Tests of Materials. (l) Acceptance. (m) Federal Payments. (n) Balances and Deficits. (o) Maintenance.

2:00 p. m. Continuation of discussion.

3:00 p. m. Should an Effort Be Made to Amend the Federal Aid Road Law? If So, in What Respects?—T. H. MacDonald, of Iowa. Discussion—H. G. Shirley, of Maryland; C. M. Babcock, of Minnesota; W. S. Fallis of North Carolina; T. J. Ehrhart, of Colorado. General discussion.

7:00 p. m. Annual informal dinner of association, Hotel Jefferson.

Thursday, December 6.

Edwin Duffey, of New York, presiding. 9:30 a. m. Recent Developments in the Design and Construction of Road Surfaces—H. Eltinge Breed, of New York. General discussion. Another Year's Experience in Maintaining a State System of Macadam Roads—H. G. Shirley, of Maryland. General discussion. The Maintenance of Brick and Cement Concrete Roads—F. F. Rogers, of Michigan. General discussion. The Maintenance of Gravel Roads—Paul D. Sargent, of Maine. General discussion.

2:00 p. m. Maintenance of Earth Roads—John H. Mullen, of Minnesota. General discussion. The Maintenance of Steel Bridges, Paints—W. S. Gearheart, of Kansas. General discussion; reports of standing committees; report of secretary; report of treasurer; report of resolution committee; election of officers; adjournment.

National Paving Brick Manufacturers' Association.

At the fourteenth annual meeting of the association, held at the Hollenden Hotel, Cleveland, November 19 and 20, officers were elected as follows: C. C. Blair, president; J. L. Murphy, vice-president; Will P. Blair, secretary, and C. C. Barr, treasurer. Mr. Murphy succeeded J. W. Robb, who declined re-election. H. H. Macdonald, who has been assistant secretary for several years, declined re-election and resigned to become secretary of the Gypsum Industries Association.

C. C. Blair, in his report as president, discussed the present condition of the association and of road-building contractors. He criticised the Council of National Defense for some of the orders bearing on the shipping situation and emphasized the fact that all industries must be ready to meet present and future conditions. He urged the immediate building of first class roads in order to aid the railroads on short hauls and characterized this work "the most necessary undertaking that can be engaged in at the present time, next to actual fighting and providing for the army." In the field of construction he urged the importance of standardization. To insure first class construction on all work he suggested that it might be necessary for the association to invade the contracting field, pointing out that at the present time comparatively few contractors have the capital and equipment to handle a large job.

In the secretary's report, Will P. Blair pointed out how, by reason of war conditions, the paving brick industry has been affected. These conditions he listed as high cost of production, lack of competent and dependable contractors, the great shortage of transportation facilities, low estimates where the law forbids the awarding of contracts on bids in excess of certain limitations, and the lack of a national advertising campaign. He urged the reduction in manufacturing cost by the use of special equipment and advocated the adoption by manufacturers of a cost accounting system. In the contracting field he urged cooperation and the mobilization of a force of reliable and dependable contractors to handle construction.

The chief engineer of the association, Maurice B. Greenough, emphasized the value of proper construction. He called attention to the fact that at the present time the association was forced to rely for proper construction upon the good will of the contractor and that the control of the brick manufacturer now ends upon delivery at the roadside. He pointed out that all the energy and money spent to improve and to maintain a high quality in the brick may be counterbalanced by carelessness of construction on the part of the contractor.

He suggested the organization of a joint contracting company on a scale broad enough to prevent the occurrence of pavement lettings without bids on brick pavements and large enough to prevent work from falling into the hands of unworthy contractors who cannot or will not build brick pavements properly. As an alternative he suggested the establishment of a corps of trained engineers, each operating over an assigned territory, whose duties should include inspecting all brick pavement construction within their territory and furthering the use of the material. He stated that these inspectors should be insured of the power of inspecting and directing the use of material by means

of clauses in all contracts for the sale of paving brick.

The assistant secretary, H. H. Macdonald, pointed out that because of the shortage of freight cars and the lack of terminal facilities railroads were unable to handle properly the freight movement confronting them. The paving of main roads between cities he advocated as a war measure. He further urged the association to embark upon a national advertising campaign to educate the people in the advantages of paving brick.

The association appointed a committee to represent the industry in matters affecting it which might arise out of any governmental relationship.

In the discussion concerning street and road improvements many instances were cited where truck movements over highways enabled industrial establishments to operate independently of railroad service. The unanimous conclusion was that highway work and road improvement was a war necessity and must be continued with all possible energy.

Michigan Anti-Tuberculosis Association.

Belief that the present war will bring about the solution of the housing problem, which in its turn has been responsible for a high tuberculosis death rate, just as previous wars have meant the perfection of hospital systems, was expressed by William B. Stratton at the tenth annual convention of the Michigan anti-tuberculosis association held in Battle Creek recently. Mr. Stratton spoke on "The Building of Workingmen's Homes With Reference to Tuberculosis and Public Health" as follows:

Announcement that the council of defense and labor are planning to place before congress a program calling for $160,000,000 for the purpose of housing its munition workers is proof that this country expects to follow the work of Great Britain.

From his majesty's office of works, plans have gone out, resulting in the erection of 1,600 houses for munition workers near Woolwich, which is only one of the big community plans of the English.

This government handling of the housing situation will mean the bridging of the impossible chasm which has hitherto existed. In America we have seen so-called "company" houses a failure and surely the cost of materials and land is too prohibitive for private enterprise to undertake proper housing of the workingman.

Since industrial housing schemes have had to come to a stop and since it would be of no use to have factories if we can't have healthy men, the government ought and is going to take over the problem as the English government has.

Certainly this is one of the biggest things which has come out of the war. At present, 40 per cent of the deaths due to tuberculosis alone can be directly blamed upon bad housing conditions.

Buildings which will be erected, if the English plan is followed, will be made of cement and clay products. Rentals will be calculated with reference to condition and locality, not with regard to the cost of building the houses, stores and halls which go to make up a good-sized village.

Locally, the state building code is expected to answer some of the ordinary housing difficulties, but this measure is a preventive one following the regular march of public health improvement. In Flint the principle of the code has been applied to erection of 300 acres of houses for automobile workers. Mr. Stratton says

(Continued on page 552.)

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

WATER DISTRIBUTION EXTENSIONS are to be made by York, Ont. The engineer for the work is Frank Barber.

Tulsa, Okla., is to make extensions to its WATER DISTRIBUTION SYSTEM. The engineer for the work is E. M. Stevens.

The Jonesboro-Nettleton Road Improvement District, Arkansas, is to construct a number of PAVEMENTS. Plans and specifications were prepared by the engineers, Klyce & Kackley.

The WATER SUPPLY SYSTEM, of Keithsburg, Ill., is to be rebuilt. Plans and specifications for the improvement were prepared by C. F. Sturtevant.

Maywood, Ill., is to have a SEWAGE PUMPING STATION and SLUDGE PLANT. Plans are being prepared for the Sanitary District of Chicago by the engineer, J. McGillen.

WATERWORKS IMPROVEMENTS are proposed for Madill, Okla., to cost about $65,000. Plans and specifications for the work are by the engineering firm of Burns & McDonnell.

SEWERS are to be constructed by Union City, Ind. The engineer for the work is C. E. Hollinger.

A SEWERAGE SYSTEM and disposal plant are to be built by Lake Andes, S. D. The engineer is A. A. Loft.

STREET IMPROVEMENTS are to be made by Quincy, Fla. Plans and specifications for the work were made by J. B. McCrary Company.

PAVING IMPROVEMENTS are to be made by Eldorado, Ill. Plans and specifications for the work have been made by Frank L. Wilcox.

Filmore, Cal., has voted $60,000 for the construction of a WATERWORKS SYSTEM. Plans and specifications are in process of preparation by the engineering firm of Olmsted & Gillelen.

Quanah, Tex., is contemplating the development of an adequate and permanent WATER SUPPLY. The city has retained Henry Exall Elrod as consulting engineer to investigate and report.

PERSONALS

Fairtrace, George D., has been appointed city engineer of Dallas, Tex., succeeding Hal Moseley.

Mayors have been elected in Pennsylvania as follows: Pittsburgh, E. V. Babcock; Butler, Joseph A. Heineman; Scranton, A. T. Connell.

Rosson, W. L., has been elected mayor of Frankfort, Ky.

Smith, George W., has been elected mayor of Louisville, Ky.

For the fourth successive time, Clifford B. Wilson has been elected mayor of Bridgeport, Conn

The following mayors have been elected in Utah: Brigham, I. B. Kelly; Tooele, F. T. Burmester; Provo, LeRoy Dixon; Springville, George R. Maycook; Sandy, W. W. Wilson; Payson, Henry Erlandson; Manti, W. W. Brown; Midvale, John A. Aylert; Fillmore, C. Clyde Callister; Lehi, Sydney Gilchrist; Logan, Roy Bullen; Garland, Loren W. Preston; Corinne, W. F. House; Eureka, Major Church; Park City, John Fitzgerald; Ephraim, John N. Dorius; Price, George A. Wootten; Richfield, N. C. Poulson; Helper, F. R. Slopansky; Mt. Pleasant, W. D. Canland; Murray, N. W. Erickson; American Fork, J. T. Gardner; Kayville, John W. Thornley; Hyde Park, J. H. Hurren; Charleston, Charles Shumway; Newton, Lorenzo Larsen; Paradise, Gideon Olsen, Jr.; Richmond, A. S. Schow; Lewiston, Lorenzo Lewis; Hyrum, Henry Jensen; Wellsville, G. J. Saslam; Providence, G. M. Pickett; Millville, Charles Anderson; Linden, Thomas Muir; Heber City, John A. Fortie; Farmington, J. H. Wood; Mammoth, John P. Anderson; Bountiful, Quayle Cannon; Spanish Fork, Irwin P. Snell; Nephi, James Garrett, Jr.; Fairview, H. L. Olson.

The following mayors have been elected in Ohio: Chardon, R. H. Patchin; Waverly, J. Donovan; Clyde, Charles Scholey; St. Clairsville, Henry M. Davis; Wellington, G. E. Wells; Mogadore, H. W. Fenton; Bryan, R. H. Lamphre; Bowling Green, S. W. Bowman; Shelby, C. E. Morris; Willoughby, W. J. Carmichael; Newton Falls, R. Scott; Greenspring, J. D. O'Connel; Wadsworth, Dr. F. W. Boyer; Kent, M. L. Davey; Niles, C. Crow; Oberlin, J. D. Yocum; Athens, E. C. Woodworth; Hamilton, C. J. Smith; Wapakoneta, F. A. Klipfel; Cincinnati, J. Galvin; Millersburg, S. B. Fair; Oxford, J. S. Hughes; Portsmouth, H. H. Caps; Paulding, B. H. Laughlin; Tiffin, G. M. Eidt; Orrville, E. P. Williams; Huron, F. McQuillan; Delphos, G. N. Leasure; Delaware, A. J. White; Nelsonville, L. McDowell; Wauseon, E. F. Hanson; Cadiz, R. M. Atwood; East Liverpool, J. S. Wilson; Salem, F. W. Webster; Youngstown, A. Craver; Bellefontaine, U. L. Kennedy; Painesville, E. G. Huntington; Toledo, C. Schrieber; Lorain, A. J. Horn; Bucyrus, William Ott; Batavia,

(Continued on page 552)

NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

GASOLINE MEASURING PUMPS.

For Fire Stations, City and Contractors' Garages.

With the increased use of motor apparatus and equipment and the rising efficiency in such use more and more accurate records of operation are being kept. Such records of fuel and oil have been recognized as the basis of economical operation by an ever-growing number of fire departments, public works officials, police departments having motor cycle squads and patrols, contractors using auto equipment and gasoline-driven machinery, county highway officials, municipal garage superintendents, etc.

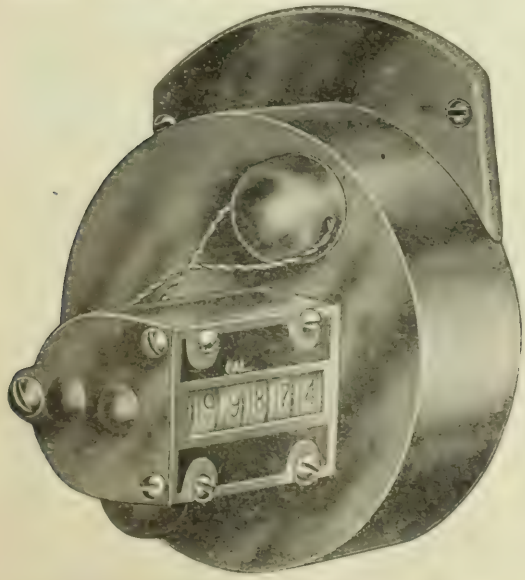
Probably the best method of obtaining such records is with the use of a measuring pump. The "Wayne Monarch" pump has a number of features which make its use in such services as those mentioned of decided advantage.

It is a continuous forward motion pump, no backward strokes being required. Fifteen revolutions discharge five gallons and return the plunger. A lever device enables the operator to return the plunger to the bottom by simply pushing up on the trip.

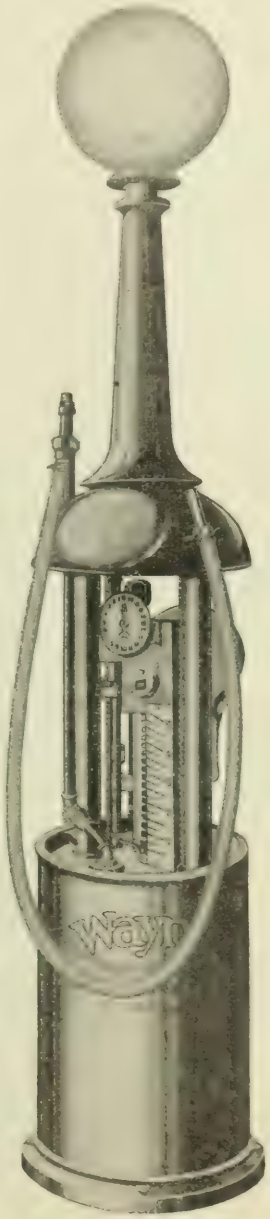
A twenty-gallon irreversible register shows instantly how many gallons have been discharged. This dial is aluminum faced, numbered in red and black, and is 6 inches in diameter. It is illuminated at night by the dome light. A 1,000,000 gallon gear-driven meter accurately records each gallon or fractional part of liquid taken from the pump. There is a quantity stop, so arranged that, by simply turning a lever, one gallon, two gallons or five gallons may be accurately measured through the pump. The computing scale is graduated and aluminum faced and it enables the operator to tell accurately and instantly just what fractional part of a gallon has been obtained from the pump.

A postive centrifugal filter is conveniently located in the pump head. Water, dirt, dust and all impurities are positively separated from the gasoline before it is discharged.

The Wayne pump is made in a number of sizes and types for handling gasoline, kerosene, lubricating and other oils. Portable outfits are also included in the line. Tank systems and underground storage systems are also made for this service.



1,000,000-GALLON WAYNE PUMP METER.



WAYNE PUMP.

The accompanying illustrations show the "Wayne Monarch" pump and "close-up" views of the meter and of the quantity stop described. The line of pumps is made by the Wayne Oil Tank and Pump Co., Fort Wayne, Ind.

CHEMICAL ENGINE FOR ARMY SERVICE.

American-La France Equipment on Ford Chassis.

The U. S. Army has found an important use for a light, speedy type of fire apparatus in the Aviation Section of the Signal Corps and has contracted with the American-La France Fire Engine Co., Inc., Elmira, N. Y., for twenty-two type 32 American-La France chemical engines on Ford chassis.

The factors said to have been considered in the choice of this type of chassis were its simplicity, durability and year around reliability. Considerable study has been given by the American-La France experts to the designing of fire equipment adapted to the Ford chassis. The general tendency is toward overloading, consequently particular attention was paid by the American-La France engineers to the question of proper weight distribution, thereby minimizing the danger of overloading in service.

The apparatus for the Signal Corps was of standard design, with two twenty-five gallon chemical tanks equipped with a by-pass system. This arrangement permits the recharging of one tank while the other is discharging and insures the maintenance of a powerful chemical stream for as long as is necessary.

This type of apparatus has also filled a long felt want in small towns and rural communities. It is particularly adapted to the class of fire service involving widely separated farms and dwellings where its speed is of immense importance. The value of this feature, together with the simplicity of operation, has also been recognized by many industrial plants, and American-La France fire equipment on Ford chassis has been adopted to increase the efficiency of their fire fighting organizations.

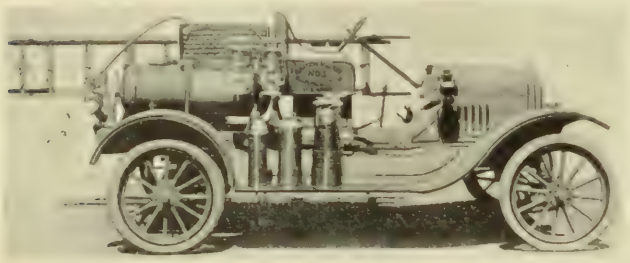
The specifications of the apparatus follow in brief: The chassis is a Ford Motor Company's standard. The tanks are two of 25-gallon capacity each, made of seamless drawn steel. The hose equipment includes 150 feet of ¾-inch special four-ply chemical hose with brass shut-off nozzle and two tips. A sixteen-foot extension ladder is part of the outfit. Other equipment includes a fire hose basket, two fire

department type lanterns, one crowbar, one axe and one No. 5 Babcock extinguisher.

The apparatus is shown in the accompanying illustration.

INDUSTRIAL NEWS

Cast Iron Pipe.—Prices remain the same after the recent rise of $5 at Birmingham and Chicago. The New York prices also remain unchanged. Municipal business is still being withheld to a large extent because of prices: Quotations: Chicago, 4-inch, class B and heavier, $58.50; 6-inch, $55.50. New York, 4-inch, class B and heavier, $59.50; 6-inch, $56.50. Birmingham, 4-inch, class B and heavier, $53; 6-inch, $50; class A, $1 extra, all sizes.



AMERICAN-LA FRANCE CHEMICAL ENGINE FOR ARMY SERVICE.

The General Electric Company, Schenectady, N. Y., among its latest publications includes two indexes, one indexing the supply-part bulletins and the other the descriptive bulletins and sheets. Bulletin No. 4,021 describes and illustrates the R.-F. line of adjustable speed motors.

The Lakewood-Galion Company, Galion, O., was recently incorporated by interests connected with the Lakewood Engineering Company, of Cleveland. The latter company some time ago acquired the plant of the Galion Dynamic Motor Truck Co., which it will equip for the manufacture of electric trucks and tractors, storage batteries and trolley locomotives. The capital stock of the new company will be $100,000 and its general offices will be in Cleveland in connection with those of the Lakewood Engineering Co.

The Sullivan Machinery Company, 122 South Michigan Ave., Chicago, Ill., announces that Mr. Joseph H. Brown, hitherto assistant manager of its New York office, has been appointed district sales manager at Chicago to succeed Mr. William P. J. Dinsmoor, who has resigned. Mr. Wallace T. Roberts, formerly sales manager in lower Michigan, northern Ohio and northern Indiana, has been appointed district manager at Denver. He succeeds Captain Matt R. Blish, ordnance dept., U. S. A., acting manager at Denver since last May. Mr. George W. Blackinton, manager at Denver up to last May, is captain of a National Army infantry regiment at Camp Funston, Kansas.

Cement Draintile and Concrete in Alkali Soils.—A report on the durability of cement draintile and concrete in alkali soils, containing the results of a third year's tests, conducted by representatives of the United States Bureau of Standards of the Department of Commerce, in cooperation with the Department of Agriculture, the United States Reclamation Service, and the Portland Cement Association, has been published by the Bureau of Standards as Technologic Paper No. 95. The book contains nearly 150 pages and has a large number of halftones and other illustrations. It may be obtained at 35 cents per copy from the Superintendent of Documents, Government Printing Office, Washington, D. C.

NEWS OF THE SOCIETIES

(Continued from page 550)

that ideal conditions of light, air and private yards are features of these structures.

There is no doubt but that the key to the tuberculosis problem lies in the housing question. It has been stated recently in an architectural publication that the shacks built at the time of the flood emergency in Galveston are still doing duty as slums.

Such is the usual experience with temporary buildings, and a terrible situation would be created in this country if, in the case of the emergencies of housing which will arise with the erection of new factories for the manufacture of munitions or other war supplies, the government did not step in and plan for substantial buildings. Even though the condition is fairly temporary, the presence of the well-planned village would mean that its houses would not be empty.

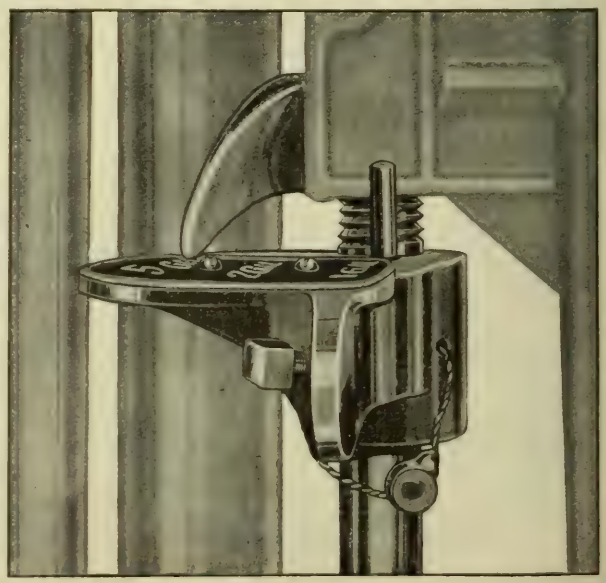
PERSONALS

(Continued from page 550.)

N. L. Bennett; Canton, C. E. Poorman; Warren, E. Parks; Troy, C. E. Harmon; St. Marys, H. C. Smith; Granville, C. D. Coons; Lima, B. Simpson; Alliance, C. S. Westover; Ada, Clutter; McArthur, T. Sharp; Grafton, G. E. Gardner; Bellaire, C. Culbertson; Conneaut, W. R. Smith; Cambridge, J. S. Longsworth; Circleville, J. C. Collers; Defiance, G. Kirtley; Galion, F. W. Biehl; Girard, T. G. Blackstone; Eaton, H. L. Risinger; Kenton, G. H. Lingrey; Martins Ferry, J. Ralston; Medina, Rev. S. F. Dimmock; Middleport, J. H. Williams; Pomeroy, H. S. Humaker; Ashland, R. H. Davis; Van Wert, J. Gamble; Wooster, G. A. Fisher; Washington C H., V. J. Dahl; New Philadelphia, William Kuenzli; Ottawa, W. H. Handy; Chillicothe, W. S. Story; Manchester, A. H. Halderness; Seaman, J. T. Ryan; Peoples, J. M. Askers; West Union, S. B. Robuck; Winchester, William Shipley; Oak Harbor, E. Bertsch; Coshocton, F. Richardson; Fostoria, O. R. Wade; Elyria, A. Jones; Fremont, H. Day; Greenville, J. Wright; Marysville, M. Hopkins; Wellston, F. H. Ely; Ironton, A. J. Hannon; Dover, W. H. Scheu; Steubenville, F. W. Feist; Sidney, H. K. Forsythe; New Lexington, J. B. Barber; Mansfield, H. G. Brunner; Akron, I. S. Myers; Newark, H. A. Atherson; Massillon, Frank L. Koontz; Marietta, A. A. Crawford; Lancaster, John A. Mayer; Cleveland, Harry L. Davis; Jackson, E. C. Laird; Wellsville, George B. Imbrie.

The following mayors were elected in Indiana:

Jasper—George P. Wagner.
Jeffersonville—Newton S. Myers.
Kendallville—U. C. Brouse.
Kokomo—Isaac Wright.
Lafayette—George R. Durgan.
Laporte—Herman W. Saltwasher.
Lawrenceburg—J. C. McCullough.
Lebanon—Paul O. Lauer.
Linton—Andrew Miller.



QUANTITY STOP DEVICE ON WAYNE MEASURING PUMP.

Municipal Journal

Volume XLIII. NEW YORK, DECEMBER 6, 1917 No. 23

GREAT FALLS WATER PURIFICATION AND SOFTENING PLANT

Treatment of Missouri River Water with Sulphate of Iron—Omission of Lime Facilitated by Thorough Mixing—Softening—Filtering—Chlorine Treatment—Appearance of Plant Considered Important.

Great Falls, Montana, with a population of about 30,000, has for years used the Missouri river water in its raw state for both domestic and fire uses. An agitation for a pure water supply has extended over a period of about ten years, the agitation being due to the fact that the water was very turbid at certain seasons of the year and the typhoid cases in the city were also above normal; also about two years ago the State Board of Health of Montana took an active interest in the health conditions of the city, believing that much of the typhoid of the city was undoubtedly due to using the Missouri river water without adequate purification.

One bond issue for the installation of a filtration plant had previously been defeated at the polls, but the defeat was attributable largely to the fact that information concerning the beneficial results of filtration and the cost of purifying water was not clearly and fully presented to the citizens. To avoid the mistakes made formerly, the citizens undertook to inform themselves thoroughly as to the value of pure water, cost of filtration, beneficial results of filtered water and a campaign of education was conducted largely through the influence of the Commercial Club, Rotary Club, Women's Clubs and other civic organizations. At one stage of the discussion it was found that the women voters of the city would be against the bond issue for filtration unless it also included water softening; so, to insure the success of the bond issue, the plans were therefore made to provide for a combined water softening and purifying plant. Although the water is not an unreasonably hard water, the desirability for a softer water was felt by the women voters.

After bonds had been voted for the project, the engineers employed by the city, Burns & McDonnell, were instructed to prepare their plans and specifications to cover both water softening and purification. A citizens' committee was appointed outside of the City Council to take charge of the execution of the work, and this citizens' committee (which was composed of the leading citizens and several local engineers) passed upon the plans, specifications, receiving of bids, final tests and other details of the entire work.

The improvements consist of an electrically operated low-service pumping station which takes water direct from the Missouri river and discharges it into a mixing chamber where the chemicals are thoroughly mixed with the water previous to its passing into the settling basins. After passing through the settling basins the water then flows into eight 1½-million-gallon filter units; thence into the clear water reservoir.

The electrical pumping station equipment consists of four motor-driven centrifugal pumps, two 2-million-gallon pumps and two 4-million-gallon pumps, or a total of 12 million gallons pumping capacity.

The purification plant consists of, first, a reinforced concrete mixing chamber; and, owing to the softening requirements, the mixing chamber was designed with a view to a thorough mixing and a long travel of the water before passing into the settling basins. To insure the water passing through the mixing chamber and to overcome the loss in friction through baffle walls, the mixing chamber stands at a level about three feet higher than the settling basins. The travel through the mixing chamber is 1,660 feet, requiring a time in the mixing chamber of thirty-six minutes when pumping at the rate of twelve million gallons per day. When pumping at a greater or less rate the length of travel and velocity through the mixing chamber can be maintained at various rates by changing the baffle walls or cutting out a portion of the mixing chamber. The velocity through the mixing chamber of .77 foot per second prevents any sediment depositing in the mixing chamber.

The thorough mixing that is given in the mixing cham-

SETTLING BASINS, RAISED MIXING CHAMBER, CHEMICAL HOUSE AND FILTER HOUSE.

ber accomplishes considerable clarification before the water even reaches the end of the mixing chamber, and it therefore passes into the settling basin with this clarification process well started. The water has a retention period in the settling basins of about eight hours when filtering at the rate of twelve million gallons per day; the water, therefore, reaches the filters in a well-prepared condition for filtration. An examination of the residue in the bottom of the settling basins does not show any undissolved or unused chemicals, and experiments were conducted for about thirty days to determine the minimum amount of chemicals that could be used to obtain the most efficient results. It was found that from .6 to .7 grains of sulphate of iron was the amount of chemicals required for thorough sedimentation during ordinary stages of the water. This quantity will undoubtedly have to be increased during the highest turbidity stages of the water. Although the natural lime in the water is small, yet with the thorough mixing accomplished in the mixing chamber it was found that it was not necessary to add lime to the water, and the omission of lime is a large saving in the annual cost of operation. This saving in lime is undoubtedly accomplished by the thorough mixing the water receives in the mixing chamber.

Chemicals for both purifying and softening are fed by dry-feed machines, which are connected with a Venturi meter and so arranged that the chemicals are fed in direct proportion to the water used. It is believed that this saves greatly in the amount of chemicals used, as well as in getting a uniform strength of solution.

At Great Falls, as in many other cities, the volume of water pumped during the twenty-four-hour period varies greatly at different portions of the day. The rate of water consumption will vary from two to twelve million gallons per day, and the dry feed machines automatically control the chemicals, thus having the proper amount of chemicals for the water used.

The chemicals for the plant are purchased in car-load lots and hoisted by electric elevator to the fourth floor of the chemical house, where the chemicals are placed on top of concrete hoppers which lead to the hopper of the dry feed machine on the floor below.

The filters are arranged in eight units, four on each side of the main filter floor, partially exposed so that the water can be observed. The filter units are of 1½-million gallons capacity each, and cleaning is accomplished through the use of air and water and all valves used for cleaning and controlling are electrically operated. The operating tables are of marble construction. The loss-of-head gauges, sampling devices, clock and all equipment are of nickle-plated finish. The loss-of-head gauges are of the recording type which both indicate and record the loss of head consumed in the operation of the filter and indicate the time that the filter requires washing. Each loss-of-head gauge is equipped with three indicating pointers, the first indicating the water level in the filter, the second indicating the wash-water pressure, and the third indicating the loss of head in the filter. The recording chart is rectilinear in form, graduated horizontally in hours and vertically in feet, and so arranged that each will give a record for a twenty-four-hour run of the filter. The rate of filtration in each filter is controlled by an outlet controller in the effluent pipe. By means of a graduated hand-wheel located on the operating floor, the rate controllers may be set to give any desired rate of filtration between the limits of zero and two million gallons per day for each filter.

The pipe gallery beneath the main filter floor is well lighted and has sufficient space and head-room to make it easily accessible for observation or repairs.

The motor-driven air blower has a capacity of 2,600 cubic feet of free air per minute at four pounds pressure and is operated by a 50-horsepower squirrel cage electric motor. The blower is of the Root type and has a capacity and pressure sufficient to give a uniform agitation of sand by the air.

A part of the equipment is a 24-inch Venturi meter recording the rate of flow in gallons per day, with a chart recorder giving an unbroken autographic record of the rate of flow from hour to hour, and a counter-dial showing the total gallons of water that have passed through the meter. These features, while not absolutely essential in any water works plant, are considered desirable for an efficient and intelligent operation of any modern water works plant.

The guaranteed bacterial efficiency of 97 per cent was exceeded considerably in the tests, which were conducted for about thirty days; the filtered water being clear and sparkling and free from suspended matter, odors, turbidity and discoloration. In a series of tests the bacterial efficiency for each filter was found to be as follows:

Raw water from river	1,480	bacterial per cubic centimeter
Water in settling basins	910	" " " "
Water from Filter No. 1	8	" " " "
" " " " 2	14	" " " "
" " " " 3	6	" " " "
" " " " 4	6	" " " "
" " " " 5	4	" " " "
" " " " 6	8	" " " "
" " " " 7	2	" " " "
" " " " 8	8	" " " "
Average of the 8 filters	7	" " " "
Efficiency of filters, or average bacteria removal from water		99.52%
Efficiency of settling basins, or bacterial removal by settling basins alone		38.5 %

The plant is provided with liquid chlorine equipment as an adjunct to the filter plant, but no liquid chlorine was used in the test. The high number of bacteria in the effluent from filter No. 2, 14 per c.c., was due to the fact that this sample was collected immediately after washing the filter.

One noticeable result since the plant has been placed in operation is the decline in the sale of bottled water, for analyses have shown that the municipal supply is far superior to most of the bottled, including spring and distilled waters on the market.

The settling basins are 18 ft. deep, 160 ft. wide and 180 ft. long, having reinforced concrete slab covers. The floors consist of two layers of concrete with water-proofing between the joints. Two reinforced concrete 6-in. baffle walls extend the full length of the basins. The basins are divided into two chambers, so that when one is undergoing cleaning or repairs the other may be used. The mixing chamber also is divided into two chambers, so that one-half may be used while the other half is being cleaned or repaired. The outside of the settling basin is of the buttress type reinforced, but with the excavated earth filled to the top of the basins.

Beneath the filter house is the clear water reservoir, also of reinforced concrete construction, with a depth of 9 ft. The water flows from this clear water reservoir by gravity to the suction of the high-duty pumps. The location of the plant on a side hill gives twelve feet head to the suction of the high duty pumps. All the piping from the pump station to the purification plant passes through a 6 ft. by 8 ft. reinforced concrete tunnel under the Great Northern Railroad tracks.

The filter house, chemical house and head house are constructed of buff-colored pressed brick, with steel roof trusses, large windows of the "Fenestra" sash type. Considerable ornamentation was given to the exterior and interior of the filter house building, with the idea that the plant will be visited and inspected not only by the

citizens of Great Falls, but by many representatives of other municipalities. It is taken for granted that the average layman is not thoroughly familiar with the process used in water purifying and softening and it is believed that better results in cities can be accomplished by making the water users familiar with the care with which their water is treated and handled. Therefore inspections of the plant are invited. During the first month's operation of the plant at Great Falls representatives from about fifty municipalities inspected the plant and its operation, and it is believed that such inspections greatly aid in the general education of the public to realize the value of pure water and how it can be obtained. The entire grounds surrounding the filtration plant, consisting of about ten acres, is being beautified by the Park Board by building of roads, paths, lawns and shrubbery as well as ornamental lighting, in the belief that efforts to supply good, clear pure water should be supplemented by making the building and grounds equally clean and attractive.

A complete softening of the water is not attempted, as the water is not an unusually hard water, but a partial softening is accomplished at reasonable expense, the soda ash for softening being fed by a dry-feed machine into the mixing chamber along with the sulphate of iron and lime. It is believed that the installation at Great Falls embodies all of the modern features of water softening and purifying plants to make it not only efficient in results, but also economical in operation.

Great Falls, like many Western and Northwestern cities, has used water at flat rates, but with the installation of the purification plant it is realized that it is poor business policy to filter water for irrigating use for parks, lawns and war gardens; therefore, the officials are taking the preliminary steps toward placing all water users on a meter basis. The water consumption at Great Falls at the present time is reported to be the highest of any city in the United States, being approximately 400 gallons per capita per day. The use of meters was not considered while raw and highly turbid water was being used, but now with a clear, sparkling water no objection can be urged against the use of meters.

With the installation of meters it is believed that the present water purifying and softening plant is sufficient to take care of a population of approximately 100,000.

VIEW OF FILTER OPERATING FLOOR, GREAT FALLS.

A new 48-in. intake to the suction of the pumps is now being installed and other improvements for reinforcing the distribution system are in progress. The entire distribution system in the city is of cast iron and consists of about forty-five miles of pipe. The water is delivered into the mains under direct pressure by five motor-driven high-service centrifugal pumps.

The above work was let by competitive bidding and was sub-divided into three sections. The total cost,

ENTRANCE TO FILTER HOUSE

including engineering, real estate and incidentals, was approximately $225,000. Olson & Johnson, of Missoula, Montana, were the contractors who installed the settling basins, filter house and the general construction work. The low service pump installation, including all piping, was installed by the Merkle Machinery Company and consisted of Platt Iron Works pumps and General Electric Company motors. The water softening and purifying plant was installed by the Pittsburgh Filter Mfg. Company of Pittsburgh, Pa.

M. L. Morris, who supervised the installation of the work, has been appointed by the city as superintendent of filtration and has full charge of the operation of the plant. The plans, specifications, supervision of construction and final tests were conducted by Burns & McDonnell, consulting engineers.

ALLEYS IN MINNEAPOLIS.

Many members of the Minneapolis Real Estate Board have been advocating narrower streets and sidewalks and the elimination of alleys in the residence districts of that city, but this is opposed by C. E. Dutton, assistant city engineer in charge of the Paving Department. He is quoted as expressing the opinion that no street should have a roadway less than 32 feet wide.

As to alleys, he states that the council is now being asked almost daily to open alleys where they do not now exist. Seventeen new alleys were opened by the city this year at considerable cost because of the request of property owners that they be put in. "The only possible plan of building where alleys can be eliminated conveniently is where houses are surrounded by ample grounds and private driveways provided. I do not believe then that they are as satisfactory from a service standpoint as an alley." The alleys, he believes, should be wide enough to permit the placing in them of conduits for all water, gas and electric service mains and to carry on their pavement much of the heavy traffic such as ice, coal, garbage and other wagons and heavy trucks of all kinds, thus preventing considerable of the congestion in the streets.

We do not agree with Mr. Dutton in most of the above, as readers of Municipal Journal are already aware. Making a 32-ft. roadway a minimum for residence districts is, in our opinion, a waste of material and labor

and of the city's money, 20 to 24-ft. roadway pavement having proved to be abundantly wide for minor streets. As to alleys, they are great conveniences and probably are to be recommended if they are so surfaced that they can be kept clean, and if they are kept clean. To use them as heavy traffic streets, however, is wasteful of money invested in paving, since the character of pavement required would cost even more per square yard than that on the main streets; and their use for general through traffic would greatly diminish their convenience as service streets for the delivery of parcels and collection of garbage, ashes, etc., each of which involves the continual stopping of vehicles and moving slowly from point to point without interference from through traffic. Our opinion of an ideal alley is one about 20 feet wide, sloping to a gutter in the middle, and paved from property line to property line with a smooth, impervious surface capable of carrying refuse collection carts and delivery wagons.

WALLINGFORD MUNICIPAL ELECTRIC WORKS

Physical and Financial Condition of Plant After Sixteen Years of Service—Rates Reduced—Cooking with Electricity.

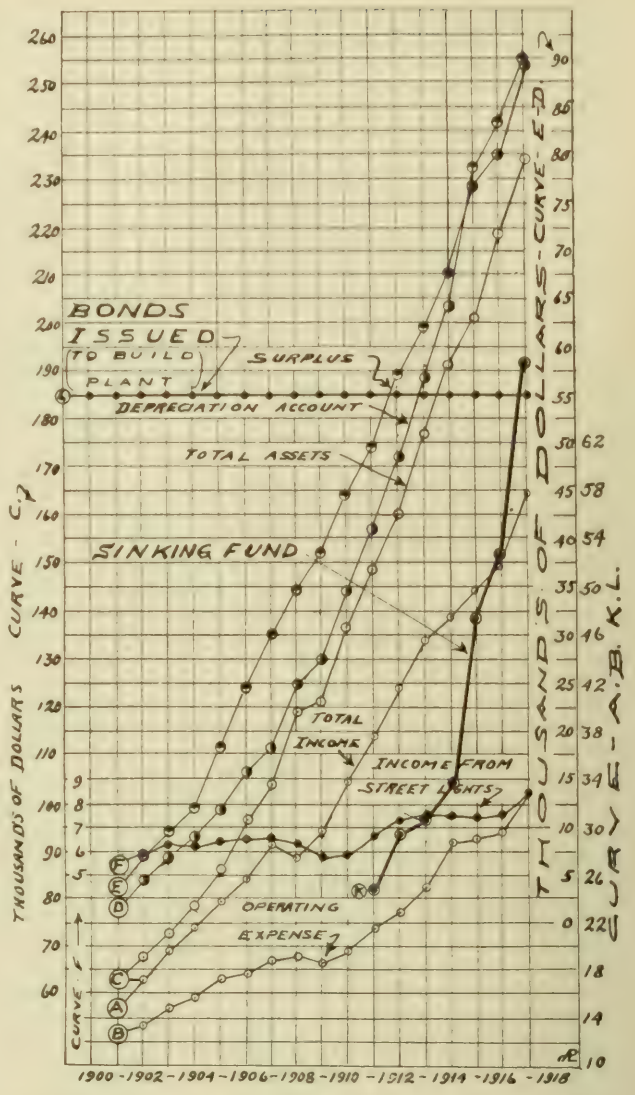
The borough of Wallingford, Conn., has for more than sixteen years operated an electric plant. The following information concerning it is taken from the report of the manager and superintendent, A. L. Pierce, for the year ending July 31, 1917:

Current is furnished by both steam and hydraulic plants, the capacity of the generators at the steam plant being 450 kw. and of that at the hydraulic plant 120 kw. At the steam plant the steam turbine generated 270 watts per pound of coal and the steam engines 149 watts, or 7.1 lbs. of coal per kw. by the engines and 3.8 lbs. by the turbine. The average cost of manufacturing at the steam station was 2.02c. per kw. and at the hydraulic plant 0.698c.; these costs not including depreciation on the investment. The average cost of fuel per kw. at the steam station was 1c. These figures include all coal used for new fires, banking, etc.

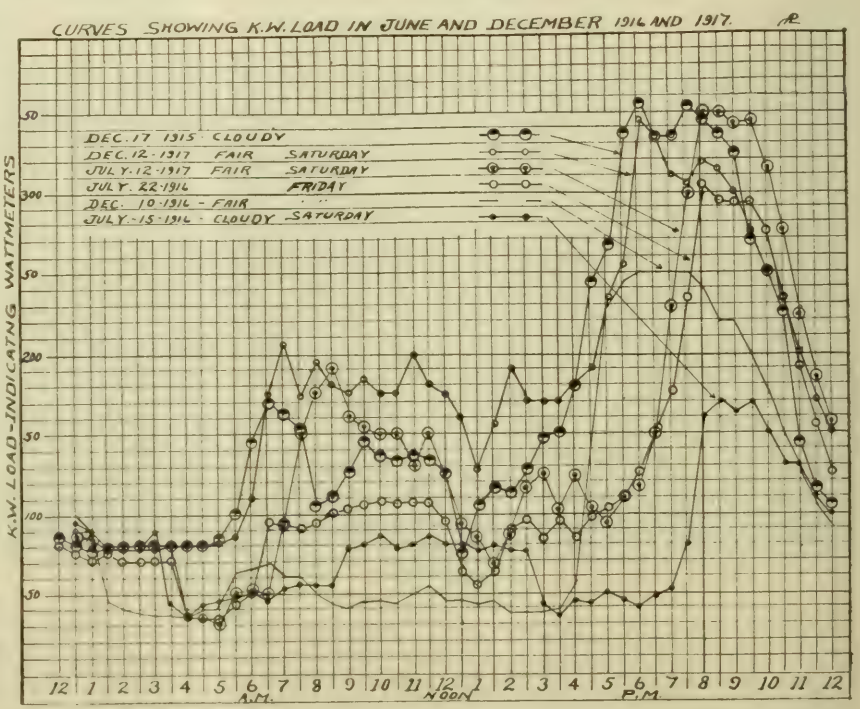
The current is distributed through the city over three street lighting circuits, six commercial lighting circuits and one 2-phase power circuit. The price received for 100-watt lamps was $18; for 250-watt, $36; for 400-watt, $80; for 600-watt, $100, and for 400-watt, in clusters, $80; all series Mazda lamps.

Considerable use is made of electricity in Wallingford households, there having been 820 flatirons in service and 25 electric ranges, while the heating apparatus used had an estimated capacity of 590 kw. The population in the area served was 10,500.

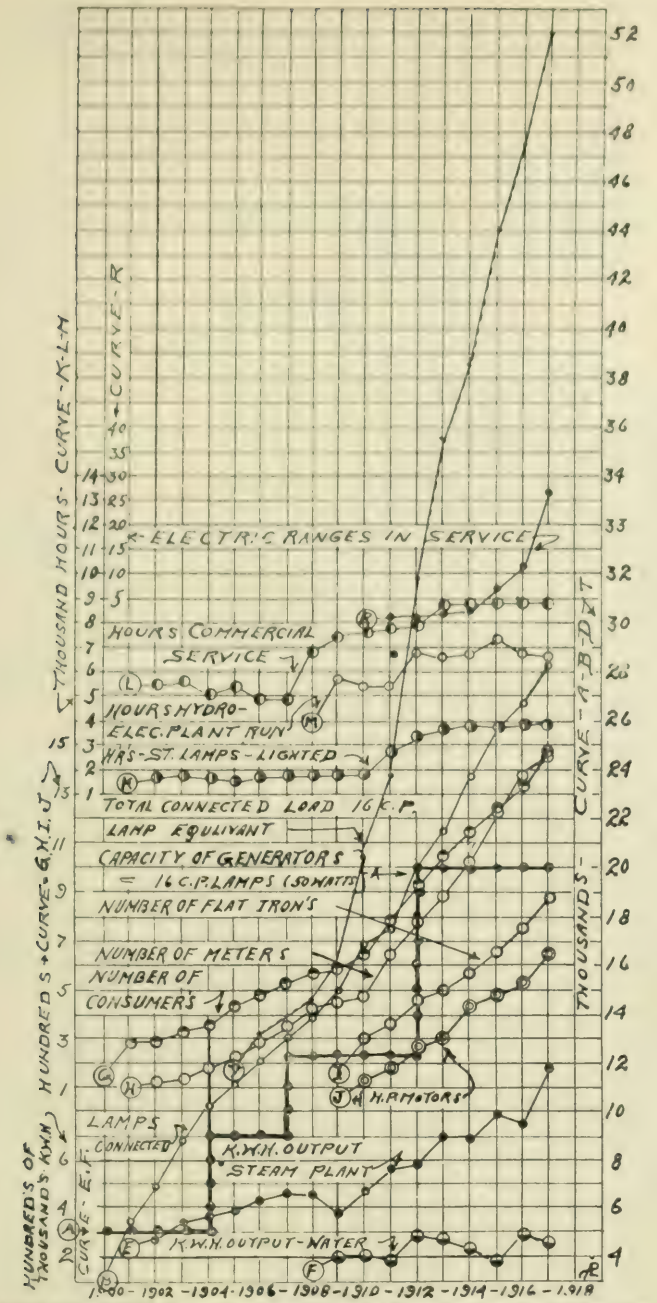
Concerning the matter of cooking by electricity, Mr. Pierce states that this is being rapidly recognized as an economical necessity and not a luxury; one indication of which is furnished by the increase in use of ranges in Wallingford of 36 per cent over the previous year. Most of the ranges are installed in the homes of working people. He recommends that the domestic



CURVES SHOWING FINANCIAL HISTORY OF THE DEPARTMENT.



CURVES SHOWING LOAD DURING SIX DAYS IN JULY AND DECEMBER.



CURVES SHOWING GROWTH OF VARIOUS FEATURES OF THE SERVICE.

department of the new high school arrange to give the girls instruction in the advantages and economies of cooking by electricity.

The amount received from incandescent lighting during the fiscal year was $40,808, and that received for power was $8,250; the total being $4,611 greater than that for the previous year.

The capacity of the steam generators was 450 kw., and that of the hydraulic plant 120 kw. The latter furnished 27.9 per cent of all of the current generated. The peak loads and other variations in current consumption were handled by the steam plant. In his report Mr. Pierce presents a very interesting diagram showing the load curves for a number of representative days under different weather conditions. There is also shown in the report a diagram setting forth the finances of the plant and another showing a number of features, such as the number of ranges in service, hours street lamps were lighted, total connected load, and number of meters for each year of operation of the plant.

In spite of the fact that loss of income has resulted from the almost universal use of the Mazda type of lamp, this has been made up by an increase of 16.7 per cent in the income from sale of power; and he expects to show even greater increase in the future as fuel for power becomes more expensive and more difficult to secure and its delivery more uncertain. In speaking of the use of electricity by industries, he states that there is in service on their system a motor that began operating in 1889 in St. Louis, was moved from there to Wallingford in 1908, and except for this change has been in continuous service during the entire 28 years, is still in service, and the total cost of repairs is believed to have consisted of one set of carbon brushes and one cleaning, the total cost amounting to not more than $2.00.

Along with many if not most coal users, the Wallingford plant has experienced difficulty in connection with its coal supply during the past year, the matter of increased cost of other materials and labor adding to this. The cost of wire and cable has increased 138 per cent, that of pole line hardware 125 per cent, electrical generators and apparatus from 30 to over 100 per cent, and labor and coal to all that the traffic will bear. It is anticipated that during the coming year the increase in the cost of fuel for the plant over the cost of the past year will be about $9,000, and that the increased cost of labor will be about $2,000, and of material about the same; giving an increase of $13,000 in all operating expenses, which will bring the estimate for 1917-18, including 8 per cent depreciation and 5 per cent profit, up to $80,356.

Something over a year ago the secondary rate for resident service was reduced from 5c. to 4c. per kwh. and other rates were reduced also. This was more or less directly the cause of a 9.8 per cent increase in the amount of current generated. Had this current been sold at the previous rates, it would have cost the consumers $1,750 more. It is possible that the increased costs above referred to may compel a return to higher rates. It may be possible, however, to avoid this by eliminating certain unnecessary expenses, by shortening the hours of street lighting service, etc.

"In view of the fact that large units in modern large power plants can generate a kwh. to 10.5 lbs. of steam with a consumption of 1.5 lbs. of coal, and that the average small plant uses from four to six times this quantity of coal to produce a kwh., it would seem that cheap power must in the future come from large centralized plants and interconnected systems."

HIGHWAY FREIGHT TRAINS.

Considerable has been said in Municipal Journal and elsewhere during the past six months concerning the advisability and probably the necessity of utilizing the highways of the country to a much greater extent than they have been up to date for the transportation of freight, because of the congestion of railway traffic owing to war conditions. In different parts of the country several more or less regular routes and schedules have already been adopted and freight traffic inaugurated over them. One of the longest of these, if not the longest, is that maintained between Akron, Ohio, and Boston, Mass., a distance of about 755 miles. This line is being operated by the Goodyear Tire & Rubber Co., which calls it the Akron & Boston Express. The equipment at present consists of two White and two Packard trucks, of 1½, 3, and 5-ton capacity, and additional trucks have been ordered for the service. The schedule calls for the round trip to be made in less than a week. J. L. Sydnor, who is in charge of the service, says that the express companies do not deliver the stuff between those two points as rapidly as that and that the costs by truck express are competing with the express rates. By this express

THE AKRON TO BOSTON EXPRESS ON A BAD STRETCH OF ROAD.

the company carries tires from Akron to their eastern branches and on the return trip brings cotton fabrics and machinery for the Akron plant. The service was started last April and it is hoped that it can be continued through the winter, although it may be interfered with by snow and ice. In this 755 miles only 28 miles is unimproved roads, which, however, cause considerable trouble in muddy weather. Another handicap is the poor condition of some of the old wooden and steel bridges. Pneumatic tires are used exclusively, for although the cost per tire-mile is greater, the wear and tear on the trucks and roads is found to be less.

ORGANIZING STATE ROAD WORK.

The state of Montana spends annually about $3,500,000 on roads and bridges and the State Highway Commission, at a recent meeting, planned an organization of the work and believes that this and the use of standard methods may increase the efficiency of the money spent by from 10 to 50 per cent. It is proposed to create seven departments, each to have charge of a different part of the work that the highway commission is undertaking to perform. These departments are as follows:

(1) Developing road construction and maintenance standards; introducing standardization.

(2) Developing and introducing bridge construction standardization; supervising bridge construction.

(3) Initiating and developing Federal Aid projects; developing system of road mapping and records.

(4) Developing a system of cost records.

(5) Developing construction organizations.

(6) Developing appliances.

(7) Information.

NOTES CONCERNING FIRE APPARATUS.

Monrovia, Cal., population about 5,500. George C. King, fire chief, reports that they have improved the efficiency of their department 100 per cent by the purchase of a triple combination Seagrave and the addition of 10 fire hydrants to the previous total of 150. The static pressure varies from 75 lbs. to 145 lbs. at the hydrants. The Seagrave triple on acceptance test delivered 325 to 350 gallons per minute through two 100-ft. lines of 2½-inch hose and with 1⅛-inch nozzles. At 300 lbs. pressure, 625 gallons were delivered. The engine was rated at 80 h. p. but developed 115 h. p. at the crank shaft. The total weight was 7 tons when carrying 1,200 ft. of 2½-inch hose, 300 ft. of 1½-inch, 200 feet of 1-inch, and a 24-ft. extension ladder, 12-ft. roof ladder, two chemical extinguishers and three Pyrenes.

Waterbury, Conn., population 95,000. Henry H. Heitman, fire chief, reports that in addition to the motor apparatus named in the table they have two horse-drawn vehicles which will probably be motorized next year by the purchase of one engine and one truck.

Evanston, Ill., population 35,000, will, says chief A. N. Hofstetter, motorize the entire department and has placed an order with the Seagrave Co. for a city service truck, a 700-gallon triple combination, two hose and chemical and booster pumps, and a tractor for the steam fire engine.

Portland, Me., population 62,000, reports fire chief Almus D. Butler, contemplates motorizing as fast as the funds will allow, probably at the rate of about $15,000 a year, until wholly motorized.

FIRE PREVENTION WORK.

We have received a letter from W. L. Shafer, manager of the Chamber of Commerce of Lebanon, Pa., from which we quote the greater part, since it will, we believe, be interesting to a number of readers. Mr. Shafer writes as follows:

I was very much interested in table No. 2 of your Nov. 8th issue entitled "Fire Prevention Work." I was so much interested, in fact, that I had a count made of the table and the answers to three of the questions that applied more generally. The result shows the following:

Number of cities and towns reporting.....382

QUESTION: "Is Fire Prevention Work Organized?"

Number of answers 302; not answering 80, or 20.9 per cent. Yes or same as yes, 127, or 33⅓ per cent. No, 175, or 45.8 per cent.

QUESTION: "Do Regular Firemen Do Inspecting?"

Number of answers, 218; not answering, 164, or 42.9 per cent. Yes or same as yes, 179, or 46.9 per cent. No, 39, or 10.2 per cent.

QUESTION: "Has Fire Prevention Bureau Reduced Fire Losses?"

Number of answers, 240; not answering, 142, or 37.2 per cent. Yes or same as yes, 217, or 56.8 per cent. Probably or in doubt, 11 or 2.9 per cent; no, 10, or 2.6 per cent.

This table certainly shows the value of fire prevention work and the answers to the last question indicate clearly the need of organization for this work in all cities.

It will be noted in the above figures that the percentages of the "yes" and "no" replies are those obtained by reference to the total number of cities in the table and not to the number of those answering. It is quite probable that failure to answer the first two questions was in the majority of cases equivalent to a negative reply. In the case of the third question, it would seem that the conclusions should be based upon the number of replies only, since those not answering were probably confined to towns in which there was no fire prevention work and which therefore should not be classed as failure of fire prevention bureaus to reduce fire losses.

In Lebanon we observed Fire and Accident Prevention Day with addresses in all the schools by uniformed firemen or those able to talk on the subject practically, together with distribution to the children of "Don't" leaflets about fires, accidents and sickness; a meeting under the auspices of the Lebanon Chamber of Commerce, with addresses on fire prevention by Mr. Chas. B. Wolfe, chief assistant state fire marshal, and an address on "Accident Prevention" by Mr. Robt. D. Young, of the Bureau of Inspection, State Dept. of Labor and Industry.

As a result of this observance, a systematic and organized inspection of properties has been instituted by Mr. John W. Mills, fire chief, a lasting lesson has been given to the children, and more attention has been given to accident prevention.

SELLING GARBAGE IN PORTLAND.

Portland, Ore., a few days ago received, through its purchasing agent, bids for the garbage of the city which at present is being consumed in an incinerator. Four bids were received, the highest being $5.60 a ton for the garbage at the incinerator, the lowest $3.15 a ton. It is probable that the garbage so purchased will be used as food for hogs or chickens.

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Contributions suitable for this paper, either in the form of special articles or as letters discussing municipal matters, are invited and paid for.

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Municipal Journal's Information Bureau, developed by twenty-one years' research and practical experience in its special field, is at the command of our subscribers at all times and without charge.

FREIGHTING WITH MOTOR TRUCKS.

During the week ending November 17 (the latest for which these figures are yet available) the total bituminous coal output of the country was 19.2 per cent less than it might have been had it not been for car shortage. While much appeared in print concerning labor shortage and strikes, these reduced the output by only 2.6 per cent, or only one-seventh as much as did the car shortage. One month earlier car shortage diminished the output by only 9.2 per cent, and the percentage has been increasing gradually since then, not because the amount of coal hauled has become less, but that, while the possible output by the laborers has been increasing, the amount which the railroads could handle has remained stationary.

The above is only one phase, although possibly the most serious one, of the transportation problem which confronts the country. It is apparent to those familiar with conditions that the solution does not lie in one direction only, but that every means which promises any relief must be adopted.

One of the most promising of these is the use of motor trucks for short hauls in order to leave the railroads free to handle the long-haul traffic. The amount of this traffic that can be handled would be perhaps doubled if all short-haul traffic could be eliminated. It therefore becomes a duty, and it may be made compulsory, to handle as much as possible of the short-haul traffic by mediums other than the railroad.

The mediums which suggest themselves as available are trolley lines, and motor trucks using the highways. The use of trolley lines offers considerable advantage, especially if the passenger traffic on these can be cut down and possibly some of the older passenger cars made over for freight and express service. These, however, are limited to the few routes over which they pass.

The motor truck, however, can reach any section of the country to which there are passable highways, and would be needed for the ultimate delivering and collecting of a considerable part of the freight and express carried by trolleys. It would therefore seem essential that trucks be utilized for this service, whether or not trolleys be used.

Taking into consideration the cost of re-handling freight from truck to other conveyance at the shipping end and from such conveyance to truck again at the delivering end, there would seem to be an actual saving in cost by using the truck for making the entire trip within certain limits of distance and availability of roads. An instance is cited elsewhere in this issue of the use of motor trucks in regular service covering more than 700 miles, and several other shorter routes have been operated over for a number of months. Four 5-ton trucks will carry as much as a fully loaded freight car, and two or three such trucks will carry as much as often is shipped on a car not fully loaded. The scheme has been proved to be practicable, even in its trial stage, and there seems to be little question that it will be developed to a much greater extent, even without any pressure being brought to bear by the Federal Government.

The indications at present are, however, that pressure of this kind will be brought to bear, as the officials in Washington apparently recognize the great service which motor truck freighting can give as a relief to the railroad situation. The adopting of such solution requires both trucks and highways capable of carrying them in all seasons. The truck manufacturers are already working up to present capacity in producing war trucks and other war material, and it is probable, or at least possible, that before next spring they will be directed to cease practically all pleasure car manufacture and devote to the production of motor trucks for war and freighting service the entire capacity of their plants which is not used for manufacturing the liberty engine and other war material.

While the truck manufacturers are preparing for the enormous extension of the truck freighting business, it is essential that the highway officials be equally active. Those who have charge of roads near the large cities realize that nothing wears these out more rapidly than heavy freight trucks, especially if the roads are of the lighter construction of a few years ago. It is evident that heavier pavements must be provided for this class of traffic and more careful and thorough maintenance be maintained. Macadam, either water-bound or bituminous, will not stand up under it. But it is impracticable to give to every road a surface capable of carrying such traffic, and therefore it seems necessary that certain routes be laid out to which such traffic must confine itself, and these routes only be given the expensive surfacing required for such service.

The collection of food products from the country districts, while it may call for equally as heavy trucks, will not require anything like the intensity of traffic for which the freight highways should be planned; moreover, such heavy freight would be confined to a few weeks each year, and it might be best to adopt for such roads the cheapest type of construction and maintenance that would carry this traffic through this particular season of a few weeks, even though extensive repairs would be required at the end of that time to keep the road in condition until the next season of heavy traffic comes around.

There seems to be little doubt that this enormous expansion of motor truck use of the roads is certain to

come next year and continue through the duration of the war (and who can say that it will cease then?); and road officials can not begin a day too early to prepare their highways for it.

CONTRACTORS' MATERIALS AND MOTOR TRUCKS.

A use of motor trucks which we believe should be adopted much more extensively is in connection with contracts where the bulk of the materials employed can be obtained within a hauling distance of 20 to 50 miles. As told in several articles in Municipal Journal during the past year, a number of contractors have found it cheaper to haul sand, broken stone and similar materials used in road construction entirely by truck from sand bank or crusher many miles away directly to the work than to have the material hauled to and loaded upon freight cars, brought in these to the nearest siding, unloaded into wagons or trucks and hauled from one to five miles to the work.

Throughout most of the eastern states and in many of the central and western ones, quarries can be so located that no piece of road will be more than twenty or twenty-five miles away from one, and in most localities the distance need not exceed four or five. South Jersey and eastern Maryland and Virginia are exceptions, but both are easily reached by water with a comparatively short road haul at the end. Sand is found locally in many places, and a comparatively short haul will supply to almost any job a fine aggregate acceptable for the work.

There are several advantages other than that of mere cost, also, in using trucks alone for this service. The supply is not interrupted by loss of cars of material, nor, on the other hand, is the regular routine interfered with by the necessity of unloading a train of cars rapidly to avoid demurrage. In emergencies, by using all trucks 24 hours a day an enormous amount of material can be carried, tripling temporarily the rate at which it could be furnished by an ordinary 8-hour service. Some contractors have in fact utilized their trucks continuously day and night, including Sundays, and thus obtained the maximum of carrying capacity at a minimum cost for plant. Utilizing a fleet of trucks, the rate of supplying material can be made quite flexible by adding or removing one or more trucks as occasion requires.

The probability is that next year will find the difficulties of securing regular, uninterrupted freight transportation by railroad even greater than it was this year, and those contractors who have provided themselves with sufficient trucks to enable them to eliminate raliroad haul to a large extent will be in a much more favorable situation for contracting for road work and for other classes requiring continuous large supplies of material than will be those not so provided.

FIRE APPARATUS IN SERVICE.

On this and the following pages are given the remainder of the table listing the motor fire apparatus in service in about five hundred municipalities in the country. On page 558 will be found notes concerning such apparatus in several cities supplementing that given in the table. On the same page is given a synopsis, by a correspondent, of certain data concerning fire prevention work that was contained in the table published November 8.

It is apparent at a glance that, taking cities of all sizes and in all sections, more chemical and hose with ladders are used than any other kind of apparatus. Chiefs' cars and hook and ladder trucks are next in order of numbers. A synopsis of all the figures in this table will be given next week.

MOTOR APPARATUS IN SERVICE (Continued).

City and State.	Chief's Cars.	Chemical and Hose With Ladders.	Chemical and Hose Without Ladders	H. & L. Trucks.	Triple Combinations.	Hose Wagons.	Tractors.	Chemical Engines.	Gasoline Pumping Engine With Hose.	Gasoline Pumping Engine Without Hose & Chem. Gasoline	Gasoline Pumping Engine With Chemical.	Gasoline Driven Steam Pumper.	Fuel or Service Wagons.	Repair Wagons.	Squad Wagons.	Water Towers.
New Jersey:																
Flemington	....	....	....	1	....	....	2	....	....	....	....	2	....	....	....	....
Freehold	....	....	....	1	....	1	....	1	1	....	....	1	....	....	....	....
Glen Ridge	....	....	1	1	1	....	....	....	....	....	....	....	....	....	....	....
Hackensack	1	2	....	(1)	....	....	....	....	1	....	....	....	....	....	....	....
Haddonfield	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Hammonton	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Irvington	....	2	....	1	1	....	....	....	....	....	....	....	....	....	....	....
Jersey City	5	1	17(4)	10(2)	....	....	15	....	....	....	....	5	3	1	....	....
Kenworthy	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....
Lambertville	....	....	1	1	1	....	1	....	....	....	1	....	....	....	....	....
Millville	....	2	....	1	....	(1)	....	1	....	....	....	....	....	....	....	....
Pitman	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....
Plainfield	2	3	....	1	1	....	....	....	1	....	....	....	....	....	....	....
Roosevelt	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....
New Mexico:																
Raton	1	....	1	....	....	....	....	....	....	....	....	....	1	....	....	....
Roswell	2	1	....	....	....	1	....	....	....	....	....	....	....	1	....	....
New York:																
Albany	4	11	....	4	....	....	1	....	....	....	....	....	14	....	....	....
Amityville	....	....	1	2	....	2	....	....	....	....	....	....	....	....	....	....
Auburn	1	2	....	1	....	1	....	....	....	....	....	....	....	....	....	....
Batavia	....	2	....	1	....	....	....	....	....	....	....	....	....	....	....	....
Binghamton	2	6	....	1	....	....	....	....	1	....	....	1	....	1	....	....
Brockport	....	2	2	....	....	....	....	....	....	....	....	....	....	....	....	....
Buffalo	15	5	7	2	1	1	5	....	6	....	1	5	1	3	....	2
Canastota	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Cohoes	....	2	....	1	2	....	2	....	2(1)	....	....	1	1	....	....	....
Corning	....	....	1	....	1	....	....	....	....	....	....	....	....	....	....	....
Elmira Heights	....	....	....	....	1[3]	....	....	....	....	....	....	1	....	....	1	....
Freeport	....	1	2	1	....	....	2	....	....	....	....	....	....	....	....	....
Fulton	....	....	1	1	1	....	....	....	....	....	....	....	....	....	....	....

Geneva	1	1	....	1	1	1	1	....	....	....	....	....	....	....	....	....	....
Gloversville	1	....	....	....	1[3]	1	....	....	....	....	....	....	....	....	....	....	....
Goshen	....	....	1	1	1	1	....	....	....	....	....	....	....	....	....	....	....
Herkimer	....	1	....	1	1	....	....	....	....	....	....	....	....	....	....	....	....
Jamestown	1	2	....	1[4]	1	....	....	....	....	....	....	....	....	....	....	....	....
Johnson City	2	....	1	1	....	1	....	....	....	....	....	....	....	....	....	....	....
Liberty	....	1	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....
Little Falls	1	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Lowville	....	....	....	1	....	1	....	1	....	....	....	....	....	....	....	....	....
Mamaroneck	....	1	1	2	1	4	....	....	1	....	....	....	1	....	....	....	....
Mechanicsville	....	2	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....
Middletown	1	....	1	2	....	1	....	....	3	....	3	1	....	....	....	....	....
New Rochelle	1	3	....	2	4	....	2[5]	....	....	....	....	1	....	....	....	....	....
New York	90	....	39	86	....	84	....	....	33	....	....	110	4	1	....	....	6
Oswego	....	1	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....
Patchogue	....	2	....	1(1)	....	1(1)	1	1	....	....	....	....	....	....	....	....	....
Peekskill	1	....	2	1(1)	....	(1)	....	....	2	....	....	....	....	....	....	....	....
Plattsburgh	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....
Rome	1	1	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....
Rye	....	1	....	1	....	1	....	....	....	....	....	....	....	....	....	....	....
Scotia	....	1	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Silver Creek	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....
Solvay	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Syracuse	5	6	....	4	1	....	7	....	4	....	1	....	1	....	....	....	....
Tonawanda	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....
Utica	3	5	....	4	1	....	....	1	4	....	....	....	....	....	....	....	....
Watkins	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Waverly	....	1	....	1	....	1	....	....	....	....	....	....	....	....	....	....	....
Westfield	....	1	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....
White Plains	1	3	....	2	....	2	....	....	....	....	....	....	....	....	1	....	....
Whitesboro	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Yonkers	3	....	5	3	....	....	....	....	1	4	....	....	....	1	....	....	....
North Carolina:																	
Ashville	2(1)	3	....	2(1)	....	....	....	....	....	....	....	....	1	....	....	....	....
Durham	1	1	....	1	1	2(1)	....	....	....	....	....	....	....	....	....	....	....
Mooresville	....	....	....	....	....	1	1	....	....	....	....	....	....	....	1	1	....
Raleigh	1	2	....	1	....	....	....	....	1	....	....	(1)	....	....	....	....	....
North Dakota:																	
Jamestown	....	1	....	1	....	1	....	....	....	1	....	....	....	....	....	....	1
Valley City	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....
Ohio:																	
Akron	1	1	2(1)	2	5	....	3	....	....	....	....	2	1	1	....	....	....
Alliance	1	1	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....
Ashland	....	1	1	1	....	1	....	....	....	....	....	....	....	....	....	....	....
Bellaire	1[6]	2	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....
Bellefontaine	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....
Bryan	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Bucyrus	....	1	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....
Cleveland	12(2)	....	....	13(2)	....	23(4)	....	....	4	....	....	5	20	2	2	1	
Columbus	7(1)	7	5(1)	5	1	....	7	....	....	1	....	....	2	1	....	....	....
Conneaut	....	1	....	1	1	1	....	....	....	....	....	....	....	....	....	....	....
Crestline	....	....	1[3]	....	....	....	....	....	....	....	....	....	....	....	....	....	....
East Cleveland	1	1	....	1	1	....	....	....	2	....	....	....	....	....	....	....	....
East Palestine	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Elyria	1	....	....	1	....	....	....	....	2	....	....	....	....	....	....	....	....
Findlay	1	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....
Greenfield	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....
Jackson	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....
Kenton	....	....	....	1	....	2	....	....	....	....	....	....	....	....	....	....	....
Lakewood	1	1	....	1	....	....	....	....	2	....	....	....	....	....	....	....	....
Lebanon	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....
Lima	1	1	....	....	....	1	....	....	....	3	....	1	....	....	....	....	....
Lorain	....	3	....	2[4]	....	....	....	....	....	....	....	....	....	....	....	....	....
Marietta	....	1	....	1	1	....	1	....	....	....	....	....	....	....	....	....	....
Martins Ferry	....	2	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....
Middletown	....	2	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Mt. Vernon	1	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
New Philadelphia	....	....	....	....	1	1	....	3	....	....	....	....	....	....	....	....	....
Oberlin	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....
Orrville	....	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Portsmouth	1	....	....	1	1	....	....	....	2	....	1	....	....	....	....	....	....
Salem	....	....	1	....	1	....	....	....	....	....	....	....	....	....	....	....	....
Springfield	1	7	....	2[8]	....	....	....	....	2	....	....	2	1	....	....	....	....
Toledo	8	....	17	7[7]	....	....	....	....	....	....	....	14	2	....	(1)	1	
Warren	1	2	....	1[8]	1	....	....	....	....	....	....	....	....	....	....	....	....
Weston	....	....	....	1	....	....	....	....	....	1	....	....	....	....	....	....	....
Youngston	3	7	7	3	2	....	6	....	6	....	....	....	1	....	....	....	....

For footnotes, see page 563.

MOTOR APPARATUS IN SERVICE (Continued).

City and State	Chief's Cars.	Chemical & Hose With Ladders.	Chemical & Hose Without Ladders.	H. & L. Trucks.	Triple Combinations.	Hose Wagons.	Tractors.	Chemical Engines.	Gasoline Pumping Engine & Hose.	Gasoline Pumping Engine Without Hose & Chem. Gasoline	Gasoline Pumper With Chem.	Gasoline Driven Steam Pumper	Fuel or Service Wagons.	Repair Wagons.	Squad Wagons.	Water Towers.
Oklahoma:																
Ada		1			1											
Bartlesville		1														
Checkasha	1		1	1	1											
Hugo					1	1										
Miami			1	1												
Sapulpa	1	1		1	2											
Oregon:																
Astoria	1	3														
Baker	1	1				1		1			1					
Corvallis				1		3		1	1		1	2				
Marshfield			1	1	1											
Roseburg	1	1														
Pennsylvania:																
Altoona	1	6			1							1				
Bangor													1			
Beaver		1							1		1					
Beaver Falls	1		1	1	1	1										
Bellwood				1		1										
Blairsville		1		1					1							
Bristol	1	2						1								
Brookville																
Carlisle		3		1	1							1				
Clearfield		1														
Connellsville		2		1												
Duquesne			1			1			1		1					
Duryea		1	1		1	1										
Easton	1	3			2	1										
Franklin	1	2		1	1											
Gadeon			1										1			
Gallitzin			1	1		2										
Girardsville		1				1										
Jeannette					1								1			
Jersey Shore		1		1		1						1				
Lansford			1	1												
Latrobe				1												
Mt. Union		1														
Norristown	1	2						2	1							
Oil City	1	1				3										
Philadelphia	16	1	19	12			15		3					3		2
Pittsburgh	10(1)	30(1)		8			29(1)					22(1)				
Plymouth		3		1		1						1				
Pottstown			1	1	2											
Quakertown									1							
Reading	1	6		3	2		5	1				1				
Scottdale		3														
South Fork				1		1							1			
Sunbury		1	1	1		5	1									
Turtle Creek				1	1				1							
Tyrone		1		1		2						1				
Uniontown		2	(2)	1		(1)										
Warren		2		1		1										
West Chester		2		1				1	1							
West Berwick					1	1										
Wilmerding				1		3		1								
Rhode Island:														1		
Central Falls	1	2			1											
Woonsocket	1	3		1												
South Carolina:																
Aiken		1														
Charleston	1(2)	1			1				1		1					
Darlington		1	1													
South Dakota:																
Aberdeen	1	2				1										
Madison	1	1	1													
Watertown			1	1		1										
Tennessee:																
Chattanooga	2			1		1	1	1	7		5	1	1			
Clarksville			1													
Cleveland	1				1						1					
Greenville		1														
Humboldt		1														
Jackson		1			1		(1)									

| | | |

The WEEK'S NEWS

The State Highway Situation in Ohio, Indiana and Pennsylvania—Sewage Disposal in New Jersey Towns—Smallpox in Pennsylvania—All-Well Water Supply for Atlantic City—Fire Prevention Inspection in Connecticut—Los Angeles Dry—Bomb Kills Nine Policemen in Milwaukee—Lincoln Wants Home Rule—Trenton Indicts Car Company Officials—Car Heating in New York City—One-Man Cars in Massachusetts—The Akron Street Car Strike—Jitneys in Wisconsin Decreasing.

ROADS AND PAVEMENTS

Effect of Road Materials Embargo in Ohio.

Columbus, O.—That the order from Washington, barring the transportation of road materials in open top cars, is working a hardship on the completion of the road building program, that will result deleteriously for the national needs, was the consensus of opinion at a recent meeting of officials and trustees of the Ohio State Automobile association and the constituent clubs thereof. This order against shipping road materials in open top cars has practically put a stop to all road building in Ohio, it was stated by W. A. Alsdorf, secretary of the Ohio Good Roads federation. On the other hand, slight relief, such as one, two or five cars of material, would have finished scores of contracts that are just that much short of being complete. If these short stretches are not completed, they will seriously inconvenience the entire transportation system during bad weather. The completion of these short stretches will on the other hand greatly relieve the transportation situation, Alsdorf told the meeting. It will make possible the using of motor trucks for short hauls, thus releasing a great number of freight cars for hauls of all commodities. According to a report made to the meeting, 86 road contracts in Ohio will be completed this year, while 290 more cars would have enabled contractors to finish 150 more contracts.

Indiana Plans Main Market Routes.

Indianapolis, Ind.—The state highway commission, after months of traveling over Indiana roads and many meetings in various districts, has announced the first main market highways that have been officially designated. A former election of four of the five routes was tentative, and although the general directions of the four roads announced formerly have been adhered to in the official selection, many changes have been made. One main market highway, under the official designation, runs from north to south, three are east and west roads from the Ohio state line to the Illinois state line and one is an east and west road in the southwestern part of the state. The three main east and west roads are in the northern, southern and central parts of the state respectively. The main north and south road and the central east and west road cross each other in Indianapolis. The total mileage of the routes is approximately 800 miles, according to W. S. Moore, state highway engineer. The following main market highways have been officially designated: No. 1. The highway beginning at the Indiana and Michigan state line, thence southerly through South Bend, Plymouth, Rochester, Peru, Kokomo, Westfield, Carmel, Indianapolis, Franklin, Columbus, Seymour, Scottsburg, Sellersburg, New Albany and Jeffersonville. No. 2 The highway passing through the northern part of the state, beginning at the Illinois and Indiana state line, thence easterly through Dyer, Valparaiso, Laporte, South Bend, Goshen and Ft. Wayne via the Lincoln highway to the Ohio and Indiana state line. No. 3. The highway crossing the central part of the state, commonly called the old national road trail, beginning at the corner of the Illinois and Indiana state line, thence easterly through Terre Haute, Brazil, Putnamville, Plainfield, Indianapolis, Greenfield, Knightstown, Cambridge City and Richmond to the Ohio and Indiana state line. No. 4. The road crossing the southern part of the state, beginning at Evansville, thence easterly through Boonville, Huntingburg, Jasper, West Baden, Paoli, Mitchell, Bedford, Seymour, North Vernon, Versailles, Dillsboro, Aurora and Lawrenceburg to the Ohio and Indiana state line. No. 5. The road connecting Vincennes and Mitchell, via Wheatland, Washington, Loogootee and Shoals. The total mileage of the roads represents less than one-half of the total 2,000 miles of "main market highways" which the commission may designate under the new state highway commission law prior to 1921.

Protect Pavements from "Underground Improvements."

Cleveland, O.—An entirely new division in the city department of public service will be created next year if a recommendation embodied by director Bernstein in the 1918 budget is approved by the new city council. It is to be known as the "division of underground improvements." "Its primary purpose will be to systematize all underground work and to prevent the unnecessary destruction of pavements by untimely installation of subterranean improvements," Mr. Bernstein explained. "It is to make all plans for underground construction work of the city and of all public service corporations in advance of public improvements. This division also will pass on all permits for the opening of pavements before the director gives his final approval. A complete record will be kept relative to the time during which pavements are guaranteed by the contractor. The entire cost of the new division is not expected to run over $4,000 a year. Two or three men, one of them an engineer, will constitute its staff." It is also hoped to relieve to some extent the useless blocking of traffic by materials left during street construction and improvement work.

Keep Roads Open with Snowplows.

Harrisburg, Pa.—State highway commissioner J. D. O'Neil in a recent statement said that the highway department is working in harmony with the War Department and other branches of the United States Government, in order to relieve the freight congestion and to help avert a coal famine in the various cities and towns of Pennsylvania. He said that in every section of the state motor traffic of all kinds is increasing, and that many manufacturing and wholesale concerns are now delivering their products by trucks within a radius of 100 miles and less. He also stated that many of the towns throughout the state would be suffering from a coal famine if it were not for the coal that is being hauled from local mines by means of motor trucks. In order to keep all war emergency roads open during the winter, particularly the Lincoln Highway, commissioner O'Neil authorized the purchase of 15 snowplows, which will be attached to the five-ton trucks owned by the state highway department. Reports from the various superintendents show that over 200 cars and trucks a day are now being brought into Pennsylvania from factories in Cleveland and Detroit, and it has been estimated that during the next four months between 25,000 and 30,000 cars and trucks for Pennsylvania and other states will pass over the various state highways. Commissioner O'Neil said that the new 1918 license plates were ready. Up to Nov. 19 there were 546,740 licenses of all classes issued for the year 1917. Reicepts for 1918 registrations and licenses are running several thousand dollars ahead of the same date last year, which indicates that all records will be broken during the coming year.

SEWERAGE AND SANITATION

City Officials to Court for Allowing Pollution.

Phillipsburg, N. J.—Charged with deliberate refusal to obey a mandate of the Court of Chancery directing the city of Phillipsburg to cease polluting the Delaware River, mayor Kneedler and the four other commissioners of the municipality were cited to appear before Chancellor Walker to show cause why they should not be adjudged in contempt of court. For more than fifteen years Phillipsburg has fought all attempts to compel it to cease emptying sewage into the Delaware. The fight has been made in the state courts, the legislature and the Supreme Court of the United States. As the outcome of litigation a decree of the Court of Chancery ordering the pollution to cease within one year was affirmed by the Court of Errors and Appeals, the record being remitted to the Court of Chancery June 11, 1916. Since last January, when the decree became effective, the state department of health has made repeated efforts to force action by the municipal authorities. The health department, through the attorney general's office, obtained from Chancellor Walker a writ attaching the five city commissioners for alleged contempt of court. One plea advanced in behalf of Phillipsburg, apart from the cost of installing a sewage disposal plant, is that such action would be futile while Easton and other municipalitles in Pennsylvania are permitted to pollute the river. Pennsylvania has offered to meet New Jersey on equal terms to purify the Delaware, provided the entire project would be carried out. A number of municipalities, of which Trenton is the largest, obtain their water supply from the Delaware, whose condition has been a subject of frequent warnings from the state health authorities.

Smallpox Epidemic in Pennsylvania.

Meyersdale, Pa.—Owing to a threatened epidemic of smallpox, the borough authorities issued an order closing the local public schools and motion picture theatres for a period of two weeks in an effort to prevent the disease from spreading. The local churches and Sunday schools were also closed for the same period. Two of the cases of the disease were reported from one house.

Harrisburg, Pa.—With new cases reported daily to the office of Dr. Samuel G. Dixon, state health commissioner, there is now smallpox in twelve counties, with thirty-eight patients under quarantine. This state of affairs, according to Dr. Dixon, although it does not constitute a severe epidemic, is a serious one. Smallpox has developed since the first of October in twelve counties of the commonwealth and there are several active centers. Another danger lies in the fact that Ohio has a great many cases, as reported by the commissioner of health to Dr. Dixon, while within a few days previous to the report Cumberland, Md., just across the border, had become a center of infection with ten cases. Three trails of infection have gone great distances across the state, according to Dr. Dixon's reports. On October 23, a man came through the city of Erie on his way from Akron, O., and crossed Erie, Warren, McKean, Elk, Cameron, Lycoming and Clinton counties while he was in the eruptive stage of the disease and dangerous to all with whom he came in contact. He ended his trip at Trout Run, Clinton county. His presence is accountable for the five cases of smallpox reported under quarantine in Clinton county. On November 8, another man, while in the infectious stage of the disease, went to Philadelphia from Punxsutawney, and then on to Camp Dix in New Jersey, passing through ten counties of Pennsylvania while en route. Election day several hundred people were exposed to William Motter, a member of the election board at Blue Ball, Clearfield county, who had contracted the disease through individual contact with an originating case at Point Lookout. Half a dozen contacts have already become ill and there may be more. On November 17, another man in the eruptive stage of smallpox left a road construction camp at Seward, Westmoreland county, and went by train to Philadelphia, where he was at large on the streets, lodging houses, and other places of public resort. The department has also been notified of a new center of infection in Myersdale, Somerset county. "The state should realize that it now has a patriotic duty to perform," said Dr. Dixon, "in stamping out smallpox. Our agents through the state are competent and active men, but they can do little if the public fails to do its part. The present smallpox epidemic at Blue Ball in Clearfield county and surrounding neighborhood is directly due to the fact that a case of smallpox which came into the state from Ohio was secreted and the knowledge of it kept from the health authorities. Blue Ball is now isolated and the Pennsylvania railroad neither receives nor discharges passengers or freight there, according to our request. The public can do its share by seeing that no case where smallpox is even slightly suspected shall escape the attention of competent medical authorities. Physicians can do their part by acting in cases where smallpox may be a possibility, although it cannot be positively diagnosed, with all the precaution possible, rather than giving the benefit of the doubt of a positive diagnosis than a negative one."

Disposal Plant Plans Approved by State Board.

Washington, N. J.—Plans of the borough for the enlargement of the sewage disposal plant have been approved in a letter from the state board of health to the common council. Permission also was given to build and operate the plant, subject to revocation at any time. The borough was instructed to add two more sand filtration beds before November, 1918, and two more before November 1, 1919.

Haddonfield, N. J.—After using the town sewerage system for fourteen years the borough is considering making such additions to the plant as will make it as modern as possible with increased disposal facilities. The addition will be an Imhoff tank, according to plans submitted to the board of commissioners by the borough engineer. These plans have been approved by the state board of health. Commissioners are also considering the advisability of using the waterfall at the new Evans pond as a source of power for a municipal lighting plant.

Oppose Consolidation of Sewerage and Water Boards.

Trenton, N. J.—Last spring Governor Edge suggested that it might be found desirable to merge the Passaic Valley Sewerage Commission with the North Jersey District Water Supply Commission as a part of his economy and efficiency program. A special commission was appointed to report as to the advisability of consolidation. This commission has now reported that the merging of the two bodies would be impracticable, and that nothing should be done to interrupt the work of completion of the trunk sewer. The report will without doubt be officially approved by the governor and the legislature. The active life of the sewer body is drawing to a close, but it still has a number of important contracts to let and complete. With a reorganization of the commission, it is felt by the investigating commission complications might result that would prove much more costly than the amount that would be saved by the lopping off of the salaries of the commissioners and of their employees. At the hearings held by the commission Adrian Riker of Newark was spokesman for the sewerage commission, and Morris R. Sherrerd, chief engineer of the former Newark board of works, for the water supply commission. Mr. Riker laid particular emphasis upon the legal complications likely to ensue in the event of any consolidation taking place while the trunk sewer project is under way. He remarked that the municipalities in the district now are being asked to raise $2,000,000 additional for the work, and expressed the belief that a change in the commission at this time might cause delay, if not more serious consequences, in this respect. Mr. Riker estimated that any delay in the work would probably result in an added cost of at least $500,000, and in the event of the work being held up for any considerable period, he said the loss might easily be $1,000,000. He pointed out that reorganization of the commission might afford objectors a ground for litigation, which could result in serious delays. Speaking for the

Water Supply Commission, Mr. Sherrerd said he thought the work now in the hands of that body should not be interrupted by attempting consolidation, for the present at least.

Closing Polluted Wells.

Lawrence, Mass.—Fifty-one wells were recently closed in this city in one week as the result of tests made in the university laboratories by the university health authorities with the cooperation of the city officials. Notices were sent to the well owners to fill up or discontinue the use of the wells within five days. Wells in other sections of the city are being tested daily by the university authorities and the owners of wells in which typhoid or other injurious bacteria are indicated will be promptly notified to close the wells. This action is the result of a recent complaint by the university regarding the city's well supplies.

WATER SUPPLY

All Water Supply from Wells.

Atlantic City, N. J.—Ninety per cent of the city's water is coming from artesian wells bored to low strata levels on the municipal watershed above Absecon. The daily consumption averages 5,750,000 gallons, the highest daily pumpage for November having been 6,300,000 gallons. Additional wells are being bored and as soon as piping and machinery can be procured all the city's winter water supply will be coming from underground springs. This is the first time the city has so nearly obtained its entire supply from wells, according to Dr. J. B. Thompson, director of the department of public works.

City Buys Water Works.

Reading, Pa.—The Glenside Water company, a private concern supplying annexed territory, has been bought by city council. The price paid by the city for the plant was $32,000.

Fined for Water Waste.

Bristol, Tenn.—Thirty-seven water customers on this side of Bristol were fined in the recorders' court as a part of the vigorous program inaugurated by the city authorities to prevent waste of water by leaving spigots open, according to official announcement. At this time of the year the water supply on this side invariably runs low and the commissioners have been forced to adopt stringent means for curtailing the waste. Leaving spigots open is considered by the officials to be one of the greatest sources of waste. The maximum fine for permitting spigots to run unnecessarily in Bristol is $50 under the provisions of the water ordinance.

Suggests Reading All Meters at One Time.

Dallas, Tex.—Police and fire commissioner R. L. Winfrey proposes to save the sum of $25,000 per year and release nearly a score of men for other work by combining the duties of water, gas and electric meter readers, through the application of power invested in the supervisor of public utilities. Commissioner Winfrey's plan is to have one meter reader do the work of three others, reading the water, gas and electric meters in one trip, eliminating two others from this task. Under present conditions each utility maintains a force of meter readers, three men calling at each home during the month to check the amount of gas, water or electricity used. All of this can be done by one man and at the same time, commissioner Winfrey says, eliminating the two extra calls and saving the salaries of two inspectors. Added to this plan of time, labor and money conservation, he said, the three bills can be mailed to patrons in the same envelope, effecting a saving of several hundred dollars each month. The city now pays $17,550 per year to have water meters read and inspected, the annual budget shows, and under commissioner Winfrey's plan one-half and possibly two-thirds of this amount would be saved to the water department. It is his plan to have the waterworks department, the gas company and electric light company pay pro rata shares of the expenses of the combination readers. Half the number of men now employed in the three services would be ample enough for the combination position, commissioner Winfrey said.

STREET LIGHTING AND POWER

Voters Must Approve Leasing Municipal Plant.

Groton, N. Y.—Sustaining an opinion written by commissioner Barhite, the public service commission at Albany has denied the application of the Groton Electric Power Corporation seeking authority to lease for a term of years, the electric light plant and system owned by the village of Groton, Tompkins county. The application is denied for the reason that according to specific provisions of the village law, no village can grant any rights or franchise to public utility corporations without first submitting the matter to a vote of the electors of the village. It is held that the village, although the arrangemen proposed would apparently, eventually work out to the advantage of the village, has no right under the law to lease its plant without first bringing the matter to a vote. That the village take this step, is urged by the commission.

Withdrawal of Lands for Transmission Lines.

Washington, D. C.—The Department of the Interior recently authorized the following statement: "In the western states permits for the use of water power sites and for rights of way for electrical power transmission lines are issued by the secretary of the interior under acts of congress which provide for the occupation and use of lands by power companies. The necessity for the withdrawal from all other kinds of entry of such power sites and rights of way is obvious. If, for instance, a permit were issued for a right of way over public lands and these lands were afterwards taken up under the homestead law, a renewal of the permit could not be granted by the Government, since the land would have passed into private ownership. In such a case, a power company after once having been granted a right of way from the Government would be compelled to obtain a renewal from all the individual landowners into whose possession the land had passed. The governmental policy has therefore been adopted of withdrawing land covering the right of way needed for a transmission line in order that this narrow strip of land affected may be permanently retained in Government ownership. This leaves with the Federal Government full power to deal with permits for power transmission lines. The land under these power withdrawals may be later acquired for agricultural use, but this does not affect the right to its use for power transmission purposes; the agriculturist can simply use it in so far as farming or ranching operations do not interfere with the construction and operation of the transmission lines."

Commission Disapproves Competition.

Bronxville, N. Y.—In refusing to grant the application of the Lawrence Park Heat, Light & Power company of Bronxville for permission to compete with the Westchester Lighting Company, the state public service commission of the second district maintains that to allow competitive lighting systems would be in deliberate disregard of the law and settled policy of the state and would impose a condition from which the public might in the end be a heavy sufferer. The Lawrence company sought to furnish the business section of that village with electricity and thus compete with the Westchester Lighting Company. Originally the Lawrence company was only intended to light buildings owned by the members of a family that owns the light company. The Lawrence interests constructed new buildings, stores, residences and business blocks, and served these properties with electricity from their own plant, in some cases ejecting the Westchester Lighting Company from these buildings and the tenants' places. Since the Lawrence company was in a position to take this business over without seeking any public franchises, there was nothing the Westchester Lighting Company could do to prevent it. In August, 1916, the village granted the Lawrence company certain franchises.

A street lighting system involved the placing of wires underground, but under conditions the Westchester Lighting company could not accept. The Lawrence company accepted the lighting contract. The commission points out that in the great majority of cases in years gone by competition between utility companies operating in a single field had produced very bad results from the points of view both of the public and the competing companies. "It was recognized that this kind of competition," commissioner Emmet declares, "almost invariably resulted in the partial or complete crippling of enterprises which were subject to it, with the inevitable result that utility companies generally were not giving anything like as good service to the people as they might reasonably be expected to give under happier and saner conditions."

FIRE AND POLICE

Fire Prevention Inspection Covers State.

Hartford, Conn.—Inspectors of the Conservation Association of Connecticut, who recently started a campaign to eliminate or reduce fire hazards in this state as a war measure have completed their work in a number of cities and towns, including New Haven, Bridgeport, Waterbury, New Britain, Bristol, Plainville, Berlin, Terryville, Union City, Naugatuck, Watertown, Waterville, Thomaston, Mystic, Noank, Stonington, Pawtucket, Groton, and all of Windham County. Their work has the endorsement of the Connecticut State Council of Defense and the Council of National Defense and their methods are to make careful surveys of the places they visit to discover fire hazards and make recommendations. There are between thirty and thirty-five experts engaged in the survey. Letters have been sent by the State Council to the mayors and fire and police chiefs of the cities which, it is hoped, will help to make the task of the inspectors easier. The council also asks the general public to cooperate as much as possible with the inspectors so as to help make their patriotic efforts successful. Certain classes of property are not inspected, notably buildings that are regularly inspected by insurance companies, comparatively isolated pieces of property that are of insignificant value and certain buildings that are classed as non-hazardous.

Fireman Killed.

Osceola, Ia.—Two persons were killed and several injured and property valued at nearly $150,000 was destroyed by fire which started in an apartment house here. Richard Egleston, night marshal, and George Griffin, fireman, lost their lives when a wall of the building buried them.

Los Angeles Goes Dry.

Los Angeles, Cal.—By a vote of 54,455 to 34,281, a majority of 20,174, the voters have approved an ordinance to close all saloons after March 31, 1918. This ordinance was prepared and presented by the Anti-Saloon League. It provides for the permanent closing of all saloons at midnight, March 31, 1918, permits the sale of liquor in restaurants and cafes until 9 p. m. and permits the continuance of wholesale houses and family liquor stores, providing the liquors sold do not contain more than 14 per cent of alcohol. Two other ordinances on the same subject were presented to the voters. One was known as the "short ordinance," and did not provide any changes from existing conditions except the elimination of saloons on June 30, 1918. The third ordinance provided for closing saloons on December 31, 1918, and would permit liquors sold thereafter by wholesalers and package houses to contain 21 per cent alcohol. It was similar to the first proposition in other respects. Officials of the Anti-Saloon league campaigned vigorously in support of their own ordinance, alleging publicly that the other ordinances were presented in an attempt to befog the issue and by dividing the "dry" vote, defeat the movement. The wholesale and retail liquor men have denied these charges. The liquor interests have based their fight against the ordinance on the claim that a "dry" enactment at this time would depress realty values by taking tenants from 300 storerooms, and would decrease public revenue. It is claimed that Los Angeles will now be the largest saloonless city in the country.

Vice District Abolished.

New Orleans, La.—The city's legalized vice district has been forced out of existence, an ordinance for that purpose passed by the city council at the request of the war department being now in effect. Judge King in civil district court refused to grant an injunction of a keeper of a resort to restrain the city authorities from enforcing the ordinance. Attorneys for a resort keeper announced an appeal from judge King's action would be taken to the supreme court.

Police Chief Reinstated.

Atlanta, Ga.—James L. Beavers, former chief of the Atlanta police department, convicted on charges involving inefficiency and insubordination, has been exonerated and reinstated as chief by the police commission before which the case was tried for a third time. Beavers waived all claim to back salary, amounting to approximately $8,000. Chief Beavers was dismissed from office in August, 1915, after he had been convicted on two charges. The case was carried to the Fulton superior court on a writ of certorari, and returned to the commission, after which he was again convicted on amended charges. The case then was carried to the superior court for a second time on another certiorari and returned to the commission, the third trial, which had been postponed three times, resulting in his exoneration and subsequent reinstatement. Capt. William M. Mayo was appointed police chief after chief Beaver's dismissal. Chief Beavers signed an agreement to resign after ninety days, providing a majority of the members of the commission requested him to do so. Beavers immediately entered upon his duties as chief, chief Mayo being made a captain.

Nine Policemen Killed By Bomb in Station.

Milwaukee, Wis.—Following investigation by city, state and federal officers, a number of alleged anarchists have been rounded up in connection with the death of nine policemen and a woman in the central police station due to the explosion of a bomb. The bomb was taken to the station by an Italian, who said he discovered it in the basement of a church in the Italian district. The Italian was met near the station by detective Bart Maloney. Maloney, escorting him into the station, placed the bomb, which was enclosed in a black box, on a table in the waiting room while he took the man into the office of police lieutenant Flood. Detectives were on the second floor of the building at the time responding to roll call. When they came down the stairway and noticed the black box one picked it up to examine it. The bomb then exploded. The lower floor of the building was shattered. Seven of the men were killed and a number injured, two dying later. A woman who had come in to make a complaint was also killed. The dead men are Stephen H. Stecker, Fred Kaiser, Albert Templin, Paul Weiler, David O'Brien, Frank Caswin, Charles Seehawer, Henry Deckert and Edward Spindler.

GOVERNMENT AND FINANCE

Vote for Home Rule Charter.

Lincoln, Neb.—This city has adopted the home rule charter at a special election by a vote of 990 for to 135 against. Less than one-tenth of the voters in Lincoln voted. One-eighth of those who did vote were election board officials. There was absolutely no interest in the election shown by the great mass of the voters and the opposition to the proposed charter was too light to make itself felt. The total vote was 1,125 and the city's total registration is 12,128. On December 2, 1913, a similar special charter election was held. Despite a vigorous campaign for and against, the vote was light. Then 2,505 voters cast the ballot. Of this number, 1,849 were negative and 656 for the charter. Opponents of that charter centered the fight on two or three issues, a leading one being a

proposed amendment relative to the city's powers in taking over public utilities. Charles W. Bryan led the opposition. In order to build and operate a public utility, the charter proposed that the city be required to submit the question of condemnation of the properties of the holding concern to the voters. If the voters turned down the proposition, it must be submitted again in not less than twelve months. If the voters twice turned it down, then the city might go ahead and build its own utility. Mr. Bryan claimed that the majority of the framers of the charter were financially interested in privately-owned utilities. The small vote at that election was surprising. This year there was no public or private denunciation of the proposed charter. Instead of making new laws it makes new conditions—which will permit a city to govern itself.

Gives Up Commission Form.

Appleton, Wis.—At the recent election, the voters showed their disapproval of the commission form of government by voting that it be abandoned. This form was in effect for six years. The city commission claimed that the town had been cleaned up and the debt reduced under the commission administration.

New City Manager Appointed.

East Cleveland, O.—East Cleveland's first city manager will be C. M. Osborn, who was for ten years city engineer of Lorain, Ohio, according to an announcement by the city commissioners, W. M. Pattison, A. W. Calder, E. M. Sprague, J. F. Pease and T. P. Cagwin. Mr. Osborn will take the reins of municipal management Jan. 1, when the city's new form of government goes into effect. The commissioners picked Mr. Osborn from a large list of available men. Mr. Osborn, who is 43, is well known in Ohio as a municipal engineer. After serving Lorain as assistant engineer for three months, he was placed in charge of the department, and has remained there for ten years. He is a graduate of the Case School of Applied Science. After leaving the school he entered the employ of a Cleveland firm of engineers then engaged on work on the Sault Ste. Marie canals. He remained with the firm seven years. In Lorain, Mr. Osborn has been identified with many engineering projects. He has had charge of river and harbor improvements and directed the building of the Baltimore & Ohio subway there.

TRAFFIC AND TRANSPORTATION

Car Company Officials Indicted.

Trenton, N. J.—Criminal indictments, charging the maintenance of a common nuisance in illegally having poles and wires on certain streets of the city, have been reported by the Mercer county grand jury against all of the officers and directors of the local trolley system, the Trenton and Mercer County Traction Corporation. The indictments were unanimously found by the jury, following the disclosures of the grossly defective service made by the members of the city commission, who appeared in person to press the complaints. The charge is that of a misdemeanor and the maximum sentence, if convictions are found, is three years in prison and a fine not exceeding $1,000 each. It is anticipated that a big legal fight will be instituted to have the indictments set aside and save the trolley officials from going to trial. The indictments returned each contains fifteen counts, specifying the illegal use of that number of streets by the trolley officials. In addition to president Rankin Johnson and former president Oscar Crosby, former judge George W. Macpherson and Edmund M. Hunt, the remaining two directors in the operating corporation, are likewise indicted. Indictments were also found on fifteen counts against the directors of the three corporations from which the lines were leased by Crosby. These directors are Ferdinand W. Roebling, Jr., John A. Rigg, Richmond L. Jones, E. H. Ginnelley, Walter A. Rigg, T. W. Crookett and John W. Goodwin. Three separate indictments, containing fifteen counts each, have been found against the Riggs, Roebling, Ginnelley, Jones and Crookett, because they are all directors in three of the corporations owning the local trolley system. The complaints of the city, which have been made for years, point out that despite repeated requests the streets on which the tracks run have been allowed to remain in dangerous condition. Other nuisances denounced in this report are that the company allows material to lie on the streets indefinitely; track inlets are sadly neglected; there are continual delays in all paving and repaving work on streets occupied by car tracks, hindering city contractors from prosecuting their work on account of delays in track replacement and repairs, in some instances the company employing nine men on work that required at least 25 or 35 men all the time; indifference of officials of the company to the quality of material used for repair work; encouragement of poor workmanship by using inferior concrete mixture and lean grouts to save materials; destruction of city water pipes by electrolysis; low joints in rails, caused by rotten ties and absence of ballast; neglect of tracks over grade crossings; feed wires are allowed to sag, bringing damage and destruction to trees; trolley poles of iron are in dangerous condition due to corrosion at the base; substitution of iron poles by wooden ones, contrary to ordinances, and "continuous disregard of promises made by trolley officials to the city commissioners and the street department."

Director of public safety LaBarre, city counsel Bird, George L. Record, public utility expert, and city engineer Swan have made trips to Cleveland and Detroit to make a survey of trolley conditions and engage an expert to look over local trolley conditions, with a view of bringing about improved service. The commission instructed them to pay particular attention to conditions in the western city having a three-cent fare. Engineer Swan will pay particular attention to the street paving as done and maintained by the trolley companies, while director LaBarre, who is largely responsible for the present fight against the Trenton and Mercer County Traction Corporation for the purpose of bringing about improved facilities, will confer with city officials and others. Mr. Record and Mr. Bird will be in consultation with the legal departments and interview experts qualified to make a survey of local conditions of trolley service.

Heating of Cars to Be Tested.

New York, N. Y.—The Brooklyn Rapid Transit Company recently requested that the public service commission allow the suspension of its heating order during the rush hours. J. J. Dempsey, superintendent of the elevated lines of the company, explained to the commission that it is not proposed to stop heating the cars altogether, but to heat them for an hour before they were placed in service for the rush hours so that only a small percentage of the energy now used for heating would be necessary to maintain the temperature at a reasonably comfortable level. He said that to furnish heat for all cars in accordance with the original commission order would mean the consumption of from 100 to 400 tons of coal a day, according to the weather, or the expenditure of about 30 per cent of the total output for heating alone. Only in exceptionally cold weather would it be necessary under the plan suggested by the company to have more than two points of heat in the cars, and much of the time only one point would be necessary. Following a hearing the commission agreed to the plan of the company for a test of proposed new heating arrangements on its cars. The commission directed also that the test contemplated be put into operation under the following provisions:

The plan of the company is to heat a few cars at the depot to a certain temperature, then turn off the heat and send the cars out.

The cars on which such tests are to be made shall not number more than three on each surface line during each rush hour, and two complete trains on each elevated or subway line.

The cars shall be selected by the electrical engineer and the chief of the transit bureau of the commission.

The tests shall be made between the hours of 7 and 9 a. m. and 5 and 7 p. m. on each week day, and shall continue during the next two weeks or such further period as the commission shall prescribe.

The electrical engineer and the chief of the transit bureau of the commission will direct and supervise the tests and they shall have the power of prescribing the manner of making the tests and record their results.

Full and complete records shall be kept, showing the tests made, the lines, type of car, testing conditions, number of passengers carried on each car, the temperature inside and outside the cars at suitable intervals, and any other relevant facts, all of which shall be submitted to the commission at the adjourned hearing in the case on Dec. 2.

The representative of the commission on any test car shall have the power at any time to order the test on that car terminated and to require heat turned on to the extent deemed necessary.

The commission states that it shall not deem as a violation of any provision of the heating order of April 26, 1912, any act or omission of the company or of any of its officers and employees with reference to any car used in such experimental test and displaying such sign, nor any temperature maintained in such car during any period of the experiment. The present order of the commission requires the company to maintain a temperature of not less than 40 deg. Fahr., or more than 65 deg. from Oct. 15 to April 15. The order is effective except when the company is prevented from complying with it by storm, accident or other emergency beyond the company's control. Mayor-elect John F. Hylan sent a letter to Oscar A. Straus, chairman of the commission, in which he said that he felt certain the commission would not grant the suspension of the heating order and that the commission would see to it that the law was properly enforced and that cars were properly heated as the health of the community demanded. He said: "If the transit corporations do not live up to the law I will ask the proper authorities to take action." According to newspaper reports he said: "If the public service commission does not compel the Brooklyn Rapid Transit company to heat its cars during the coming winter, as required by law, I shall ask all the civic bodies of New York City to accompany me to Albany to ask for the removal of the commission."

Vote For Subway Ordinance.

Cleveland, O.—The subway ordinance, urged by mayor Harry L. Davis, who has been re-elected, was approved at the recent election by a vote of 56,242 against 39,961. As a result of this, preparations will be made for the construction of subways and an underground terminal in the congested portion of the city. Under the state laws, mayor Davis will appoint a commission with sole power over the location, planning and construction of the subways. The commission will appoint its own engineers and counsel. It was on this point that opposition during the campaign was centered. Those who disapproved of the plan were in favor of the subways, but wished to leave control of them in the authority of the city officials.

Commission Approves One-Man Cars.

Boston, Mass.—The Public Service Commission has approved the application of the Bay State Street Railway Company to operate one-man cars on a number of its short rural lines. This marks the introduction of the single operator car in Massachusetts. This permission is given, the board says, in an effort to increase the net earnings by lessening operating expenses on the light travel lines of which there are found to be fifteen in all the Massachusetts territory served by the company. In its order recently handed down the board says: "The objection usually made to one-man cars is that they are dangerous, but recent improvements have robbed this objection of its force. Both of the cars now offered for approval by the Bay State company have safety features which are not found on its regular equipment and which are described in a report made by the inspection department of the commission as follows: 'There are two doors, one on the right side of each end, and each car is arranged for pre-payment service. The controller handle is of the "dead man" type, arranged so that if the pressure of the hand on it is released at any time, when the air brakes are not set, certain emergency features will be put into operation. The cars are equipped with combination straight air and automatic emergency brakes and also with hand brakes. The emergency features which are set in operation by releasing pressure on the "dead man" handle, consist of arrangements for throwing off the power, applying sand to the rail, setting the automatic air brakes, opening the forward door and unlocking the rear one. These emergency features are controlled and operated by air and are not dependent upon the presence of power, and can be effected whether the car is moving or standing. In case of failure in the air apparatus, the hand brake can be used and the doors opened and closed by hand, but, of course, in this case the safety features would be absent. The operator's brake valve controls the service and emergency brake operations, the door movements and also the service application of sand to the rail.' At the hearings the employes of the company opposed the introduction of the new cars, but in the opinion of the commission this attitude is contrary to their own best interests. The Bay State company has a number of country lines with very low earnings which are in serious danger of being abandoned unless expense can be decreased, and it also has short-haul lines of the type already mentioned where it ought to be possible to increase both service and patronage by the use of one-man cars, and to meet jitney competition to much better advantage. The company has recognized the principle that a higher rate of wages ought to be paid the man who combines the functions of motorman and conductor and if these cars will accomplish the results anticipated, they will improve a situation which is as threatening to the employes as it is to the company itself. The commission directs that these cars shall only be operated under the following conditions: (1) When a car is running the operator shall transact no business relative to the collection of fares or the issue of transfers. (2) If the operator has occasion to leave his car, he shall remove and retain in his possession the reverse handle of the controller."

Decrease in Number of Jitneys.

Madison, Wis.—The number of jitneys operated in the state is declining, according to information compiled by the railroad commission. On September 1, 1916, the number of bonded carriers licensed to operate in Milwaukee was 297, and on September 1 this year the number was 200. For most of the months throughout the year the number operated in Milwaukee has been less than 200. In Racine there are 28 bonded carriers licensed to operate, 18 of which are on route 1 and 10 on route 2. In Kenosha there are 45 operators. Since September 4, 1915, there have been 647 different bonded carrier operators operating cars in Milwaukee, Racine and Kenosha. Of this number 412 are no longer operating, showing that while the total number of operators has changed, there has been only a slight reduction in the number of cars operated. Racine and Kenosha conditions have not changed materially since a year ago. Slight reductions have occurred.

End Street Car Strike.

Akron, O.—The 800 motormen and conductors of the Northern Ohio Traction & Light Company have returned to work following an agreement. The men are to receive an increase of 5 cents an hour for the period between Nov. 1 and May 1, 1918. Negotiations may be opened at the expiration of this contract for a new wage scale, but in case of a disagreement between the company and the men the adjustment of the scale must be left to arbitration. This clause was introduced in the last proposition made by the company. An increase of 5 cents an hour from Nov. 1 to May 1, 1919, was offered by the company the day before the settlement. This proposal was rejected. The company felt that it should protect itself against excessive demands in case of a shorter period by the use of the arbitration clause, and the executive committee recommended the acceptance of the proposition in that shape. According to the settlement the men on the Akron city lines will receive 33 cents an hour for the first year, 35 cents for the second year and 38 cents thereafter. Men on the interurban line will receive 2 cents an hour more than this rate. The original demand of the men was for a straight advance of 10 cents an hour.

LEGAL NOTES

A Summary and Notes of Recent Decisions—Rulings of Interest to Municipalities

Police Power—Loitering.

(Ga. App.) An ordinance, forbidding under penalty any woman of disreputable character to loiter about the streets or stores of a city without proving that she is on unavoidable business, is not unconstitutional.—Neal v. City of Dublin, 92 S. E. 1021.

Assessment—Wrong Basis.

(Wash.) An assessment by a municipal corporation for opening an alley is on a fundamentally wrong basis if in fixing the amount to be levied against one lot the benefits to another lot owned by the same persons and not assessed were considered.—City of Hoquiam v. Moe, 165 P. 1055.

Raising Roadbed Illegally—Remedy.

(Vt.) Where the roadbed of a street is raised by the street commissioners without legal authority, it cannot be urged against a bill in equity for relief that there was an adequate remedy at law.—Collins v. City of Barre, 101 A. 43.

Assessing Cemetery for Sewers.

(Ind.) Burns' Ann. St. 1914, § 8726, providing that land used for cemetery purposes shall not be assessed for sewers or drains, applies only to such sewers or drains as come in physical contact with, abut, or are adjacent to, lands held or occupied for cemetery purposes.—City of Gary v. Gary Oakhill Cemetery Ass'n, 116 N. E. 741.

Injury to Foundation—Basis for Suit.

(N. Y. City Ct.) Where a subway contractor agreed to do work without injury to adjacent foundations, and, if damage was done, he would make it good, adjacent owners must sue contractor on breach of his covenant, instead of for damage done property.—Congregation Rodeph Sholom v. Bradley Const. Co., 165 N. Y. S. 507.

Assessments—Exempting Property—Authority.

(Ind.) In the absence of any specific statutory authority, the exemption of property from local assessments will not be presumed, and any law to that effect will be strictly construed.—City of Gary v. Gary Oakhill Cemetery Ass'n, 116 N. E. 741.

Damage to Gas Mains by Sewer Construction.

(Or.) A gas company could not recover damages to mains necessarily resulting from construction of a city sewer.—Portland Gas & Coke Co. v. Giebisch, 165 P. 1004.

Proportioning Contract Money to Creditors.

(Kan.) Where contract price of municipal improvement was insufficient to meet all claims, and proportionate distribution of loss was ordered, claim of one subrogated to right of laborers and materialmen should be reduced only in proportion that total loss bore to total cost of improvement.—Fidelity & Deposit Co. of Maryland v. City of Stafford, 165 P. 837.

Retaining Part of Contract Money for Guaranty.

(Kan.) Under Gen. St. 1915, § 1237, city of first class may contract for repaving of street and provide for retention of part of contract price as a guaranty of repair, and provide for annual payments to contractor for the repair.—Rohr v. Crancer, 165 P. 823.

Right of Council to Supervise Streets.

(Ark.) Under Kirby's Dig. §§ 5530, 5607, city council of city of first class had right to supervise repair of streets, to enforce provisions of contractor's maintenance bond, and to control litigation on bond.—McClendon v. City of Hot Springs, 195 S. W. 686.

Right to Prohibit Use of Streets.

(Tex. Civ. App.) City given absolute control of its streets by Legislature may wholly prohibit use of its streets for prosecution of any private business or grant use with such restrictions as it deems proper.—Peters v. City of San Antonio, 195 S. W. 989.

Street Privileges to Corporations.

(Ill.) A city is not required to grant privileges to all public service corporations on the same terms.—City of Springfield v. Interstate Independent Telephone & Telegraph Co., 116 N. E. 631.

Assessing Cost for Sewage Disposal Plant.

(Ind.) Under Burns' Ann St. 1914, §§ 8695, 8965, a city may construct a sewage disposal plant and assess the cost on a district to be formed as provided by section 8724 for sewers.—Prevo v. City of Hammond, 116 N. E. 584.

Assessing Costs—Benefits.

(Iowa). Supreme court cannot presume, from mere fact, that two separate tracts of materially different area are assessed same amount for street improvement in front of them, that such assessment is inequitable and unjust, and not according to special benefits.—Snyder v. City of Belle Plaine, 163 N. W. 594.

Subway Contractor—Liability for Light and Air.

(N. Y. Sup.) A contractor, constructing subway for city, is liable for interference with easement for light, air, and access possessed by lessee of land abutting on the street.—Sinsheimer v. Underpinning & Foundation Co., 165 N. Y. S. 645.

Sidewalk Vault—Liability for Injuries.

(N. Y. Sup.) If city revokes permit to occupy vault beneath sidewalk, to permit construction of subway, but contractor does not assume control of vault, contractor is not liable for personal injuries caused by open coal hole.—Scarpolla v. Oliver Typewriter Co., 165 N. Y. S. 885.

Subway Construction Not Governmental Function.

(N. Y. Sup.) In constructing a subway, through its contractor, a city discharges a proprietary and not a governmental function.—Sinsheimer v. Underpinning & Foundation Co., 165 N. Y. S. 645.

Accident on Icy Walk—Liability.

(N. J.) Owner who had erected retaining wall along sidewalk so that snow accumulating on premises melted, ran over on to sidewalk, and froze, was not liable to pedestrian falling on ice, where there was no showing that snow had been brought to premises from another place.—Lightcap v. Lehigh Valley R. Co., of New Jersey, 101 A. 187.

Police Power—Prohibiting Sidewalk Vaults.

(N. Y. Sup.) A city can enforce an ordinance prohibiting maintaining of vaults under sidewalk without a permit.—City of New York v. Gerry, 165 N. Y. S. 659.

Police Power—Prohibiting Jitneys on Certain Streets.

(Tex. Civ. App.) An ordinance prohibiting jitneys, other than those operating from A. to U., from using certain streets, is not an unwarranted discrimination rendering ordinance invalid.—Peters v. City of San Antonio, 195 S. W. 989.

Right of Taxpayers to Recover Funds.

(Ind. App.) Taxpayers may, in behalf of themselves and others similarly situated, take steps to recover misappropriated funds, and to that end to commence and prosecute actions.—Michigan City v. Marwick, 116 N. E. 434.

Street Ownership—Adverse Possession.

(Md.) Where city widened street and remained in possession for 40 years, under authority of Acts 1836, c. 63, vesting in it title to street so widened provided that rights of individuals who owned fee in street were not interfered with, it acquired title to fee by adverse possession, since agreement whereby proprietors relinquished all interest in the street though not sufficient to convey fee, showed that city occupied street in the belief that fee vested in it.—Brady v. City of Baltimore, 101 A. 142.

Bases for Assessments and Benefits.

(Iowa). Frontage may be taken into account as basis for determining benefits to land from improvement in street, and mere fact that assessment was substantially in accordance with cost of improvement in front of each tract is not conclusive that assessment was not according to special benefits conferred, and does not overcome presumption that city council proceeded according to law.—Snyder v. City of Belle Plaine, 163 N. W. 594.

NEWS OF THE SOCIETIES

Calendar of Meetings.

Dec. 26-29.—AMERICAN POLITICAL SCIENCE ASSOCIATION. Annual meeting, Philadelphia, Pa. Secretary, Clinton J. Swartz, Trenton, N. J.

Dec. 27-29. AMERICAN SOCIOLOGICAL SOCIETY. Annual meeting, Philadelphia, Pa. Secretary, Scott E. W. Bedford University of Chicago, Chicago, Ill.

Jan. 3, 4.—NEW JERSEY STATE LEAGUE OF MUNICIPALITIES. Annual convention, Trenton, N. J. Secretary, Clinton A. Swartz, Trenton, N. J.

Jan. 15-17.—VIRGINIA GOOD ROADS ASSOCIATION. Seventh annual convention, Richmond, Va. Secretary, C. B. Scott, Richmond, Va.

Feb. 6-13.—FIRST CHICAGO CEMENT MACHINERY AND BUILDING SHOW. Supersedes annual Chicago Cement Show. Held at the Coliseum, under direction of the National Exhibition Co.

March 17-24.—PAN-AMERICAN CONGRESS ON CHILD WELFARE, Montevideo, Uruguay. Secretary, Edward N. Clopper, 105 East 22d Street, New York, N. Y.

The American City Planning Institute.

The recent meeting of the American City Planning Institute in New York City disclosed that the zoning movement started by New York City is fast spreading to the other cities of the country. This session of the institute was held in New York for the special purpose of permitting those interested in zoning in other cities to study at first hand the actual operation of the New York law. Zoning commissioners to prepare zoning plans have been appointed in Philadelphia, St. Louis, Newark and other cities. Members and representatives of these zoning and city planning commissions and committees to the number of about one hundred attended the conference.

The morning session was held in the office of the Committee on the City Plan of the Board of Estimate and Apportionment in the Municipal Building. Edward M. Bassett, former chairman of the New York Districting Commission, presided. The detailed methods and results of zoning were discussed by Robert H. Whitten, secretary of the Committee on the City Plan, Rudolph Miller, chairman of the Board of Appeals, H. H. Murdock, architect, and Francis P. Schiavone, of the staff of the Committee on the City Plan. After this session the members of the conference took an automobile trip through lower Manhattan and Brooklyn. They were specially interested in the preservation of residential districts and in the detached house sections of Flatbush, where, under the "E District" regulations, the erection of apartment houses has been stopped.

Groups of visiting planners were conducted through the Washington Square section, where certain residential areas are to be preserved under the zone plan; also through 14th street, 23rd street and Sixth avenue, old retail and department store centers. They were also shown recent interesting examples of the use of the set-back principle in the construction of buildings in order to comply with the height provisions of the Zone Law.

In the evening the visitors held a meeting in the Engineering Societies Building and Mr. Lawson Purdy presided. Addresses were made by John P. Fox, consultant to the Committee on the City Plan; E. A. Haldeman, engineering advisor to the Philadelphia Zoning Commission, Harland Bartholomew, engineer of the St. Louis Zoning Commission, and others.

This meeting in New York was significant on account of the widespread interest that has been developed throughout the country in the building zone movement initiated in New York City.

Empire State Gas and Electric Association.

At a recent executive committee meeting of the Empire State Gas and Electric Association the following plan for the appointment of various committees was approved: (1) The executive committee would authorize the following committees or sections: commercial committee, gas production committee, gas distribution committee, electrical production committee, electrical distribution committee, electrical meter committee. (2) Each member company would be asked to name, on form provided, representatives to be the official members of these committees or sections. All notices of meetings of these committees or sections would then be sent to the persons thus named. (3) At the first meeting of each section the members would elect from the official company representatives a chairman, a vice-chairman and a secretary, who would act as an executive committee of such section. These persons would hold office for one year from the date of their election.

New England Water Works Association.

The December meeting of the New England Water Works Association will be held at the Hotel Brunswick, Copley Square, Boston, Mass., on Wednesday, Dec. 12. The program follows:

11.00 a. m. Meeting of the executive committee at the headquarters, Tremont Temple.

1.00 p. m. Lunch will be served at Hotel Brunswick.

2.00 p. m. Proposed amendment to constitution submitted to the executive committee in writing Nov. 14, 1917, and by unanimous vote recommended for adoption by the association: Strike out the whole of section 2, article IV, and make it to read as follows: Sec. 2. The annual dues shall be, for members, $5; for associates, $25.

The following papers will be presented:

"Description of Recent Construction Work at the Ayer Cantonment." (Illustrated.) By Frank A. Barbour, supervising engineer.

Informal talk on steam and power matters, by F. W. Dean, mill engineer and architect, Boston, Mass.

Talk on Porto Rico (illustrated) by Frank L. Fuller, civil engineer, Boston, Mass.

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

SEWERS are to be built by Wrightstown, Wis. The consulting engineers are Orbert & Albert.

A SEWERAGE SYSTEM is to be built by Eagle Grove, Ia. The engineer for the work is C. H. Currie.

Girard, O., is to build a big TRAFFIC BRIDGE. Plans for the improvement have been completed by the engineer, William Wilson.

Sparta, Wis., is to increase its WATER SUPPLY by drilling a new well. The engineer for the work is W. G. Kirchoffer.

A WATERWORKS SYSTEM to be built by Inglewood, Cal., is being planned by the engineering firm of Olmsted & Gillelen.

In constructing improvements to its WATER SUPPLY SYSTEM, Laurel, Mont., had the engineering services of B. C. Lillis.

A SEWAGE DISPOSAL PLANT is proposed for Macon, Ga. Plans and specifications are being prepared by the engineer, Frank L. Wilcox.

Pleasant Hills, Mo., is making some PAVING IMPROVEMENTS. The engineers for the work were the Schockley Engineering Co.

Wesleyville, Pa., is to build a sanitary SEWER SYSTEM and DISPOSAL PLANT. The city has retained as consulting engineer B. E. Briggs.

A SEWAGE DISPOSAL PLANT is to be built by Albion, N. Y. The engineer for the improvement is H. G. Kittredge.

Mazeppa, Minn., is to reconstruct a BRIDGE. The city has retained J. H. A. Brahtz as consulting engineer to prepare plans and specifications for the work.

Fort Worth, Tex., is to enlarge its WATER FILTRATION PLANT. The city commissioners have retained John H. Gregory as consulting engineer to prepare plans for the improvement.

The village of Grosse Pointe, Mich., is making extensions to its WATER DISTRIBUTION SYSTEM. The firm of Mason L. Brown & Sons is acting in a consulting engineering capacity.

NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

IDEAL CINCINNATUS MIXERS.

Batch Mixers and Pavers of Various Types and Capacities

The drum of the Ideal Cincinnatus batch mixer is designed for rapid and thorough mixing and rapid and clean discharge. It is claimed that a thorough mix of slush concrete can be obtained in four revolutions of the mixer drum, and even very thick concrete can be mixed within twenty to thirty seconds. The interior construction of the drum is as follows: Six large buckets are placed near the center of the drum. From each alternate bucket there is a wing running to opposite ends of the drum. The wings give the batch a twisting and kneading action, to which is added a tumbling and pouring action by the buckets. The spacious buckets enable the mixer to discharge rapidly, and the space between the blades, together with the large opening on the charging end of the drum, makes the mixer easy to keep clean.

The drum is of the non-tilting type and consists of two semi-steel drum heads, united by a cylinder of ten gauge blue annealed sheet steel. The drum heads are cast solid and are then machined on the outside of the rim to form a smooth running track for the trunnions and also on the inside of the rim to make a tight joint with the drum sheet. This joint is further calked and rendered watertight with asbestos cement.

The buckets and deflecting blades are made of heavy sheet steel and held on forged steel brackets, firmly bolted and riveted. The drum is chain driven, the larger sizes with a heavy steel chain and the smaller with a heavy malleable iron chain.

The loading skip is made large enough to easily hold a full charge of materials without crowding. The end of the skip is undercut, making it easier to run wheelbarrows up to it. The skip swings on two heavy angle iron pieces, which extend down the throat of the skip for about 30 inches, and are riveted to the skip itself, greatly adding to the stiffness and making it impossible for the skip to buckle. The skip rises to a very steep angle and is stopped at the discharge point automatically.

The water tank is of the open type, with a special valve, which does not allow the water to run over and which makes it possible to fill to any desired level accurately. By means of three-way valve the tank measures the water and fills itself to the required point as soon as the tank has been emptied, but, unlike a tank of the closed type, completely drains itself after each filling.

Discharge is very simple. By lowering the discharge chute levers the discharge chute is inserted into the center of the drum and empties it quickly. No more than 15 seconds, it is claimed, is required for emptying any size mixer. The construction of the discharge chute is such that concrete cannot injure the operating parts. The chute can be operated from either side and is easily handled, so that in discharging into wheelbarrows the flow of concrete can be instantly started or stopped.

The countershaft is set nearly level with the top of the drum and is well protected from grit. Power is transmitted from the engine to the drum through a multiple disk clutch on the gasoline equipments. The hoist shaft is placed directly over the drum where it cannot get splashed up with concrete or grit. A 14-inch contracting band hoist of special design is used. The large diameter of the hoist gives enough pulling power to allow the use of an 8-inch cable drum. There is an automatic stop and a powerful hand brake.

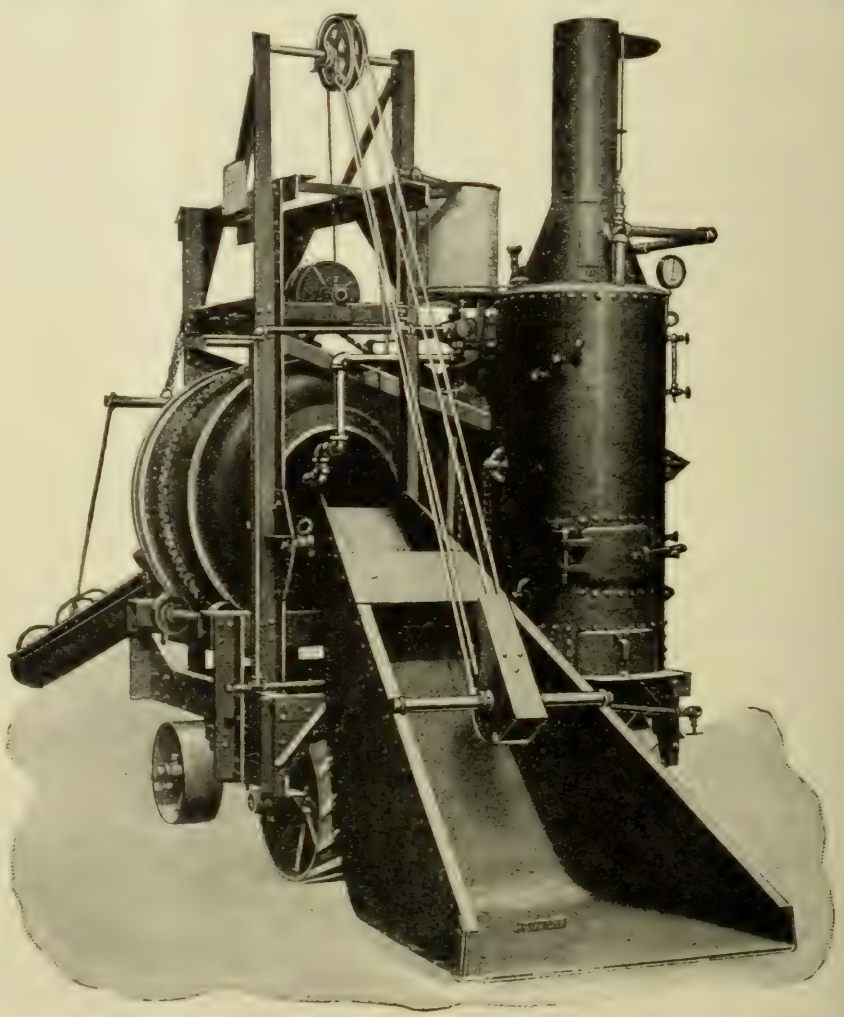
The trunnion bearings are carefully protected by the cast iron housing, steel and felt washers and a steel guard. The trunnions are fastened to the trunnion shafts by set screws. The trunnion shaft revolves in flexibly hung steel roller bearings.

The trucks are powerfully constructed of steel angles and channels, but the weight is not excessive. The wheels have heavy, wide-grooved tires and staggered spokes. Axles are of steel I-beam construction.

Novo or Ideal gasoline or Orr & Sembower steam engines are used for power.

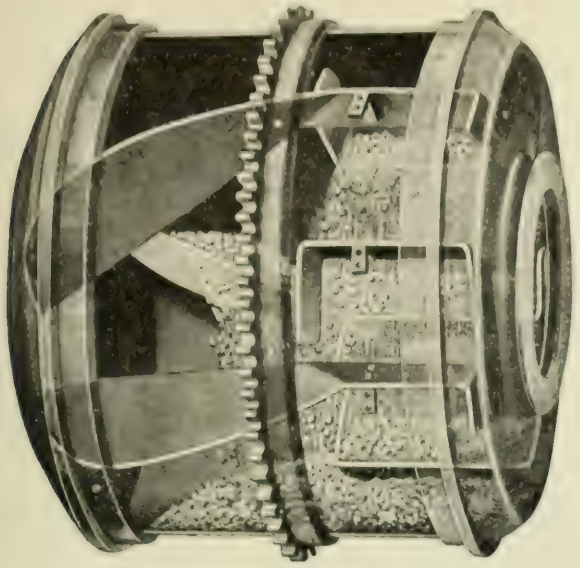
The batch mixer is made in 5, 7, 10 and 14 foot (dry) capacities. The illustration on next page shows a No. 10 power loader equipment. It is run by a 6 h.p. gasoline engine, but may be equipped for steam or motor drive.

The other illustration shows a No.



14-CUBIC FOOT IDEAL CINCINNATUS CONCRETE PAVER.

14 steam paver. It has a 6 h.p. steam engine and an 8 h.p. boiler. The traction speed is 1½ miles per hour, either direction. The distributing chute is either 12 or 15 feet long, and is arranged to discharge at four points.



"PHANTOM VIEW" OF DRUM OF IDEAL CINCINNATUS CONCRETE MIXERS SHOWING CONSTRUCTION AND MIXING PRINCIPLE.

(Note buckets and wing blades).

As it swings in an arc of 180 degrees it permits the concrete to be placed exactly where it is wanted without unnecessary shoveling.

These mixers are members of the full line made by the Ideal Concrete Machinery Company, Cincinnati, O.

COLLAPSIBLE CULVERT FORM.

One-Man Form Shows Marked Economy.

Contractors and highway officials are recognizing that the use of timber construction forms in building concrete culverts is responsible for waste of lumber, labor and time. The "One-Man" collapsible culvert form is a device made of iron bars, which is claimed to make a saving in concrete box culvert construction amounting to 25 to 50 per cent. Lower labor and lumber costs, speedier work and better construction, without danger of cracking or collapse, are the advantages claimed for this form.

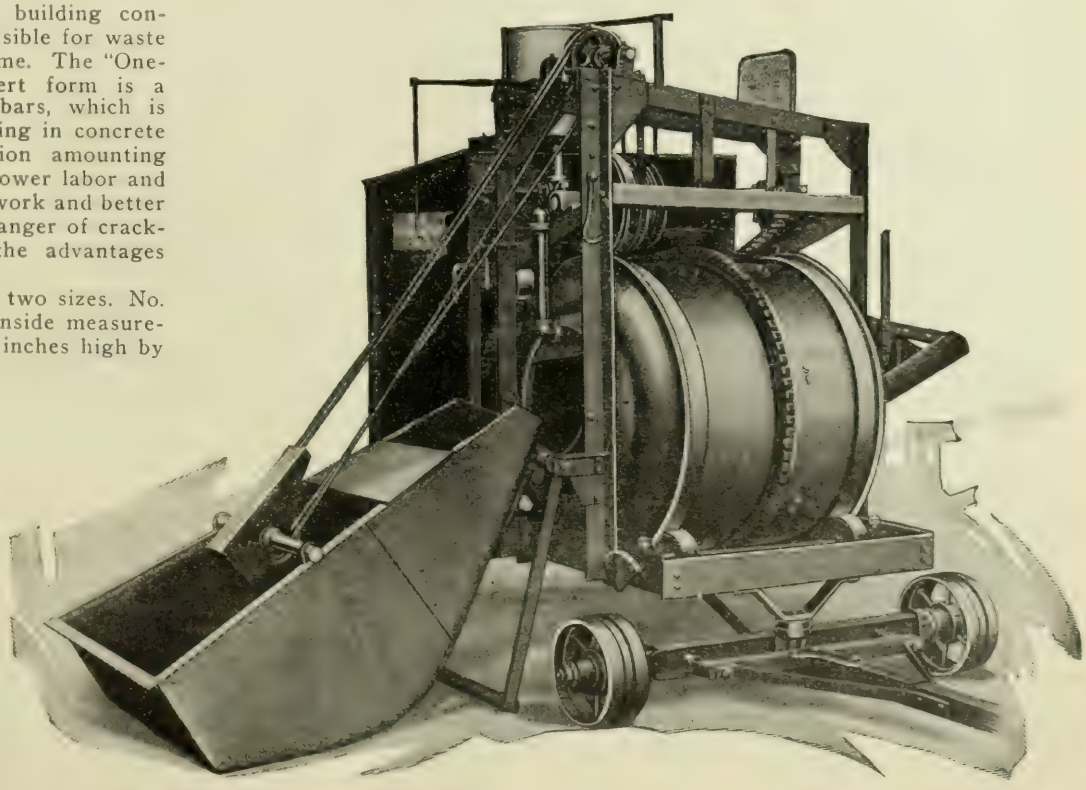
This form is made in two sizes. No. 1 builds culverts with inside measurements ranging from 14 inches high by 16 inches span to 22 by 28. By using one inch instead of two inch lumber a culvert as small as 13 x 15 can be built. The No. 2 form will build culverts ranging from 24 x 26 to 36 x 46 inches. With both sizes in a culvert building equipment 39 different culvert openings can be obtained.

The form comes in sections, easily erected and easily taken down. A 30-foot culvert can be built with four sections. As many sections as necessary are put into place, the boards are set around it, the concrete is poured, and when it is hardened the forms are collapsed and withdrawn one at a time. Where the culvert opening is too small to admit the body of a man the inner form is collapsed and drawn out with stout wires, previously attached to cross-rod and center bar. Tripping the form after the concrete has set is very simple. As shown in the illustrations on next page, the legs of the main support-braces all rest upon and are pivoted to the inner frame. A pull at the cross bar at either end of this frame draws it forward sufficiently to allow the braces to tumble down. The cross arms follow and the side uprights, which are also pivoted at their bases, drop inward toward each other, allowing plenty of clearance above. A pull on the center bar draws in the side-sills and side clearance is thus obtained.

In building a culvert where the soil conditions and force of the water do not necessitate a concrete bottom the forms may be placed at once on "two by fours." Where concrete on all four sides is required the forms may be placed at once on the base concrete if it is mixed a little stiffer. Boards are then laid on it and the forms placed on the boards. Rigidity and strength of the forms are such that they are guaranteed to be able to bear up a thickness of fully two feet of mixture the entire length of the culvert without sagging, which makes it safe to fill over the concrete before it is set, giving traffic a chance more quickly. By using two sections of the form one-half the culvert can be built at a time, and the road can thus be kept open at all times.

Cracking, due to swollen framework, occurring with lumber, is eliminated with the iron forms. The lumber is not warped nor wedged in so that it cannot be removed. In working in difficult locations the collapsible form is found of considerable advantage.

Among those who have found the



10-CUBIC FOOT IDEAL CINCINNATUS CONCRETE BATCH MIXER.

"One-Man" culvert form economical and efficient are: The highway commissioners of Grundy county, Chicago, Ill.; W. G. Killelea, contractor, Marseilles, Ill.; A. W. Jewett, overseer, Mason and Dansville road, Mich.; J. A. Cragwell, city engineer, and W. S. Harding, county surveyor, Crawfordsville, Ind.; J. H. Clements and D. Y. Stout, contractors, Crawfordsville, Ind.; Will P. McCoy, St. Joseph county engineer, Mendon, Mich.; Abner Lantz, trustee, Milan township, New Haven, Ind.

The "One-Man" collapsible culvert form is made by the Storms Manufacturing Company, Monadnock Building, Chicago, Ill.

INDUSTRIAL NEWS

Cast Iron Pipe.—Prices remain the same after the recent rise of $5 at Birmingham and Chicago. The New York prices also remain unchanged. Municipal business is still being withheld to a large extent because of prices: Quotations: Chicago, 4-inch, class B and heavier, $58.50; 6-inch, $55.50. New York, 4-inch, class B and heavier, $59.50; 6-inch, $56.50. Birmingham, 4-inch, class B and heavier, $53; 6-inch, $50; class A, $1 extra, all sizes.

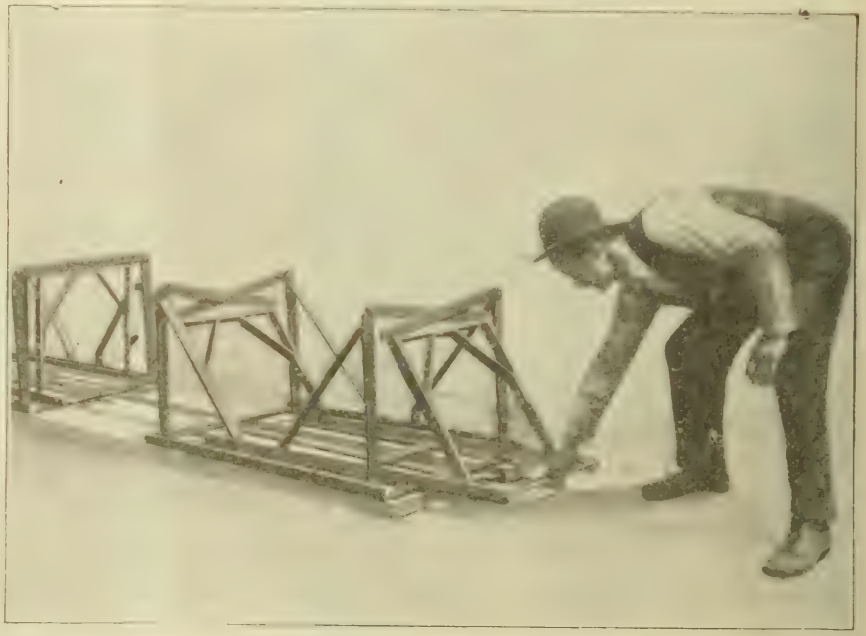
"Motor Trucks of America."

Announcement is made that the 1918 edition of "Motor Trucks of America," of which S. V. Norton, manager of truck tire sales of the **B. F. Goodrich Rubber Company,** Akron, O., is the author, will be ready for distribution on January 1st. The book, consisting of 200 pages of reading matter, illustrations and specifications, is the sixth to be issued in as many years. It is hand sewn and of heavy binding.

Complete specifications of nearly 150 of the leading gas and electric driven motor trucks are contained in the volume. In fact, there are thirty-one specifications for each model. These details are absolutely dependable, as the approval of each truck manufacturer is obtained before specifications of his model are inserted. For the reason it offers opportunity to the buyer and manufacturer to compare models, lists all makes according to sizes and affords a perspective on changes of design by comparison with previous editions, "Motor Trucks of America" is widely accepted as a complete and authentic handbook of the truck industry.

The illustrations, too, add much value to the book. They picture the very latest models and furnish the man in the market for a truck, or the manufacturer themselves for that matter, suggestions for special bodies for particular lines of work.

Great interest has always been aroused by the introductory articles by Mr. Norton. His previous papers on "Lengthening the Life of the Motor Truck," "Devices That Make for Motor Truck Efficiency" and "Fundamental Questions Involved in Changing from Horse to Motor Delivery" have been so much in demand that frequent reprints have been necessary to take care of requests for extra copies.



"ONE-MAN" COLLAPSIBLE CULVERT FORM (PARTLY TRIPPED)

One great element of value derived from "Motor Trucks of America" has been that it enables the buyer to get accurate information on all trucks without going into the market. The buyer is not obliged to write for all catalogues and thereafter become the quarry for much solicitation. "Motor Trucks of America" saves both time and money, and should prove of decided value to all who are, or may at some time be in, the market for motor vehicle equipment.

"ONE MAN" COLLAPSIBLE CULVERT FORM (SIDE-SILLS DRAWN IN).

The Asbestos Protected Metal Company, Pittsburgh, Pa., announces that after December 1, 1917, it will be represented in the state of Georgia by J. F. Schofield's Sons Company, located at Macon.

The Reliance Motor Truck Company, formerly known as the Racine Motor Company, will move to Appleton, Wis., as soon as new buildings are ready for occupancy. The company will manufacture 1¼-ton, 2½-ton, 4-ton and 6-ton models.

1917 Lead Output.—The lead production of the United States for the first half of 1917, according to C. E. Siebenthal of the U. S. Geological Survey, was 306,062 net tons, as compared with 571,131 tons for all of 1916. Exports of domestic lead to July 1, this year, were 29,241 tons, as against 100 565 tons in all of 1916. Lead available for consumption on July 1, 1917, was 268,995 tons. It was 461,173 at the end of 1916.

Municipal Journal

Volume XLIII. NEW YORK, DECEMBER 15, 1917 No. 24

CAMP MERRITT AS A CONSTRUCTION PROBLEM

Building Water Supply, Sewerage, Refuse Disposal, Fire Protection, Street Lighting, Theatres, Restaurants, Hospital and Other Necessities, Besides Barracks and Officers' Quarters, for Thirty Thousand Men in Three Months.

There are now entirely or nearly completed, thirty-two camps in the United States erected for the purpose of housing soldiers on their way to France. These comprise sixteen cantonments, three national guard camps, twelve officers' training camps, and the embarkation camp for the port of New York. The last named was one of the latest to be begun and in several respects it represents systems and methods developed from the experience obtained in the construction of the other camps.

Much is to be found in the daily press concerning the social and military side of the camp work, and figures have been published for the purpose of giving the general public some idea of the unprecedented amount of the work done and the remarkable celerity with which it was carried on. The engineer and contractor, however, can appreciate many phases of the work which would have little meaning for the non-technical citizen, and it is the aim of this article to present those features of the task involved and the method of carrying on the work, which will appeal most directly to this class. For this purpose Camp Merritt, the embarkation camp for the port of New York, will be used as typifying perhaps the most advanced method of procedure so far as engineering and administrative features go.

The description of the carrying out of this work may be given under two heads, one the description from a purely physical and engineering point of view, and the other, the administration of the work by the engineering force, the co-ordination of the various branches of work that are included in the completed camp, and in general the direction of the entire enterprise from the first blocking out of the plans to the final completion of the work. The latter is much the more important and interesting, the plans and structural details containing comparatively few features out of the ordinary; but in order that the latter phase of the work may be better appreciated, it is proposed to describe the physical features first.

The camp is designed to hold 30,000 men at one time, serving as a temporary resting place for troops after reaching this vicinity and before embarking upon the transports. The camp occupies an area of something over 700 acres at Tenafly, N. J., about 6,000 feet from the West Shore R. R., and contains about 820 buildings, thirty-eight of which were already on the site. These buildings include barracks and officers' residences, a hospital, post office, fire station, laundry, bakery, post exchange, club rooms, theatre, building for the Y. M. C. A. and one for the Knights of Columbus, telephone exchange, store houses, stables, garbage transfer station, coal trestle and bins, heating plant for the hospital, and other minor buildings. (The hospital will have capacity for 1,000 beds. The widow of Major General Merritt donated $10,000 for the erection of the club house). The heating plant furnishes heat for the hospital only. The officers' residences are heated by steam heat from individual domestic plants, and the barracks are heated by stoves. Electric current for light and power is obtained from the Public Service Corporation of New Jersey, and the water supply from the Hackensack Water Company. A sewerage system was constructed entire, including both

GENERAL VIEW OF NORTHWEST SECTION OF CAMP THREE WEEKS AFTER BEGINNING WORK.

TEMPORARY TRACK. BUILDING CONSTRUCTION UNDER WAY.

a collecting system and a treatment plant. There are about nine miles of streets, which are lighted by incandescent lamps mounted on wooden poles, the wires also being carried on wooden poles.

The camp site is upon a ridge which slopes slightly toward the south, more rapidly toward the east and still more rapidly toward the west. The difference between the highest and lowest points within the grounds is about sixty feet. The general soil consists of red clay underlaid at no great depth with red shale. Previous to the construction of the camp there were thirty-eight buildings on the grounds, which were purchased and retained for use; and six dedicated streets and roads in the area, totaling about 2,000 feet in length, were retained as a part of the street system of the camp.

The main streets of the camp are paved with waterbound macadam, and the company streets are surfaced by being graded and rolled, then covered with four inches of cinders and rolled again. As there will be continuously in the camp from 15,000 to 30,000 men, labor will always be available for carrying on any maintenance work, while the heating and power plant will furnish cinders, which can be used for maintaining these cinder roads, and the waterbound macadam also will undoubtedly be maintained in the best of condition by means of the abundant labor available. The streets constructed as a part of the work included about 28,600 feet of macadam and 17,920 feet of cinders.

The water is derived from the New Milford pumping station of the Hackensack Water Company, that company laying two twelve-inch cast iron mains for a distance of about 3,600 feet to the cantonment, these mains leading from an existing twenty-four-inch main of the company's system. (For description of this pumping station, see Municipal Journal for May 3, 1917.) Each twelve-inch main can be supplied from either direction, thus providing against any interruption of supply by a break in the twenty-four-inch main. At the end of the twelve-inch mains are set two meters, one on each main, together with valves, all inclosed in appropriate chambers. From this point the construction was carried on by the government contractor.

All the water pipe in the cantonment is wire-wound wood-stave, except that the bends, branches and other specials are of cast iron, and the service pipes are of one-inch to 2½-inch galvanized wrought iron. The total amount of pipe, both mains and services, is 87,932, or about seventeen miles. Leading from the valve chamber is a twelve-inch main, which passes through the cantonment and from which eight-inch and six-inch laterals lead. Except for the main and two branches, all the water pipes are laid in the continuous open spaces between the buildings, and nearest to those in which running water is provided. The maximum length of water main laid in one day was 4,200 feet.

SPUR TRACK FROM WEST SHORE R. R. TO CAMP.

Fire protection is provided by 145 standard fire hydrants, with one steamer and two hose outlets, connected with the main by four-inch pipe. The pressure on the distribution system under normal conditions of domestic consumption is about fifty to seventy pounds. Two triple combination motor fire engines are contained in the fire station and a regular force of firemen will be maintained; in addition to which every building is pro-

CONTRACTOR'S CAMP—BEGINNING OF ACTUAL WORK, AUGUST 20TH.

vided with chemical hand extinguishers and Geyser fire bucket pumps. When construction first began, and without waiting for the completion of the permanent system, about 6,000 feet of cast iron pipe was laid on the surface of the ground to furnish fire protection, drawing its supply from mains of the Hackensack Water Company, which were already in service providing water to the residences on the site.

The sewerage system consists of 74,732 feet of six-inch to twenty-four inch vitrified pipe in the camp, including the services, and 13,740 feet of fifteen-inch to twenty-four-inch outfall. About one-third of this length was laid with cement joints, and the remainder with bituminous joints to provide against infiltration of ground water. The depth of the sewer varies from a minimum of two feet to a maximum of seventeen feet in the outfall line. Connections to the buildings are all made with six-inch pipe. Manholes are placed at all changes of grade and of line and at intersections. These manholes are constructed of brick, and in the main streets are provided with standard cast iron heads and covers, but in the company streets are simply covered with wooden covers. The capacity of the sewers was calculated for a consumption of fifty gallons per capita per day for 30,000 men, with a maximum or peak flow 3½ or four times as great. The grades were calculated to give a minimum velocity of flow of two feet per second. In excavating the trenches, eight trench machines were employed, but rocks, boulders and tree roots interfered with their successful operation and a considerable part of the digging was done by hand. Probably half of the length of trenches within the cantonments had to be sheeted and braced, and two-thirds of the outfall line. Excavation was being carried on at twenty to twenty-five points at one time, the number of men employed on sewer work reaching a maximum of 900. The maximum length of sewer laid in one day was about 2,600 feet.

TRENCH DIGGER AT WORK ON SEWER TRENCH

ONE OF THE BUILDINGS ON THE CAMP SITE.
Used as office by Hill & Ferguson, the engineers.

The outfall sewer conducts the sewage to the Hackensack river, about 2½ miles away, where the sewage is treated by passing it through bar screens and a septic tank and treating the effluent with liquid chlorine. Eight sludge beds are provided for treating the sludge from the septic tanks, these consisting of broken stone covered with gravel and sand. As in the case of the water supply, temporary provision had to be made for sewage from the cantonment during construction, since a large number of men (reaching at one time 7,500) were at work, and most of them living within the area. For this purpose latrines were used and were burned out each night. The sewage treatment plant went into operation November 24th, the outlet into the river being completed on that day. The plant itself had been finished several days before, including putting it and the surroundings into a fine, trim condition not exceeded, probably, by any plant in the country.

The garbage is collected in covered cans, and the other refuse in separate cans, and all are carried in the original

WATER MAIN UNDER CONSTRUCTION. VIEW NORTHEAST FROM WATER TOWER.

cans to a transfer station, where the refuse is removed by contract with private parties, who pay the government for the material. Refuse cans are delivered on a long platform by the collecting wagons, which drive along one side thereof. The cans are then emptied into the contractors' trucks drawn up on the other side of the same platform, after which they are sterilized and placed at a point convenient for removal by the collecting wagons as they leave the station.

Current is brought from the transmission line of the Public Service Corporation to a transformer station, from which it is distributed through the cantonment by two distributing lines, one for power and the other for lighting. Lighting is provided in the entire 781 new buildings, a total of 860,000 feet, or about 163 miles of wire being used, 20,300 lamps and 600 poles.

Heat is provided for 771 of the new buildings, 90,000 square feet of radiation being provided for steam heating. The heating and plumbing required 160,000 feet, or nearly 21 miles of pipe. Among other quantities used on the work were 24,000,000 feet B. M. of lumber, 6,136 kegs of nails, 400,000 brick, 104,720 barrels of cement, 60,000 windows (about 15 acres of window glass), and 7,000 doors.

Among other structures may be mentioned 2½ miles of permanent railroad and three miles of temporary railroad for bringing from the West Shore R. R. the materials used in construction and later those required by the operation of the cantonment. A freight yard is provided, connected with which are six storage warehouses.

The entire work of construction was done by the MacArthur Bros. Company, under the regulation form of contract followed in the cantonment construction and previously described in Municipal Journal, under which the contractor receives the actual cost plus a percentage, which decreases as the cost of the work increases.

In the article dealing with the administrative work (to appear next week) will be described the methods employed by Hill & Ferguson, the engineers in charge of all the work, for completing this work in about three months.

SEWAGE DISPOSAL FOR A NEW YORK AREA

Population of Two and a Half Million on Flat Land Draining to Shallow Bay—Oyster Pollution—Dilution.

Although the city of Greater New York is under one political administration, it contains a considerable number of distinct topographical areas, which condition necessarily divides its sewerage problem into various more or less individual and distinct local problems. Possibly the most difficult of these is that connected with the southern part of the boroughs of Queens and Brooklyn, lying south and southeast of the village of Jamaica and containing about 45,000 acres. This territory is all tributary to Jamaica bay and through it to the Atlantic ocean, and drainage from this area could be diverted from this body of water only by a prohibitive expenditure for pumping. This district is divided into two distinct areas by Jamaica bay. At present it contains a population of about 500,000, but it is being built up rapidly and it is estimated that by 1960 the population will have increased to 2,500,000. This is a population greater than that of Berlin and most other large European cities, and is in fact exceeded at the present time only by London, Paris, Chicago, and New York itself.

The problem of sewering this district has been considered by a number of officials and commissions during the past few years and several solutions have been proposed. In 1916, the president of the borough of Queens requested the board of estimate and apportionment to pass upon a tentative plan for sewering this district. The engineer of sewage disposal of the board, Kenneth Allen, recently submitted to the board a report upon this tentative plan and also upon other plans proposed, making recommendations for the adoption of certain definite methods of solving the several problems presented. In this report, Mr. Allen has explained a number of the principles employed in developing the plan, which principles are of more or less general application and will be of interest to sewerage engineers generally. We are presenting, therefore, an abstract of that part of his report that deals with these principles and applications of them, which we think will be of interest and service to such engineers.

The magnitude of the problem has already been referred to. It is estimated that within the next 40 years the domestic sewage from this area will approximate 300,000,000 gallons a day. The expense for the construction is estimated to be about $21,500,000, and about $572,000 as the annual cost of operation and maintenance. These estimates do not include the cost of acquiring property for sewer lines, sewage treatment plants, etc.

DISPOSING OF THE SEWAGE.

Jamaica bay, which must receive this 300,000,000 gallons per day, covers about 21.5 square miles at high tide and 17¼ square miles at low tide. The tidal range averages about 4.3 feet. The tidal prism, or the volume passing through the inlet to the ocean with each flood and ebb tide, amounts to 2,308,710,000 cubic feet, and this tidal movement must be relied upon for the dilution of the sewage. The volume of water remaining in the bay at mean low tide is slightly less than the tidal prism; or in other words, the bay contains twice as much water at times of high water as at times of low water. During the latter period, the average depth is 4.7 feet, but through it pass several channels, which at points reach extreme depths of 32 to 66 feet. The amount of upland or surface water that flows through the bay to the ocean is very uncertain, but has been computed at 24,000,000 cubic feet for each cycle of the tide.

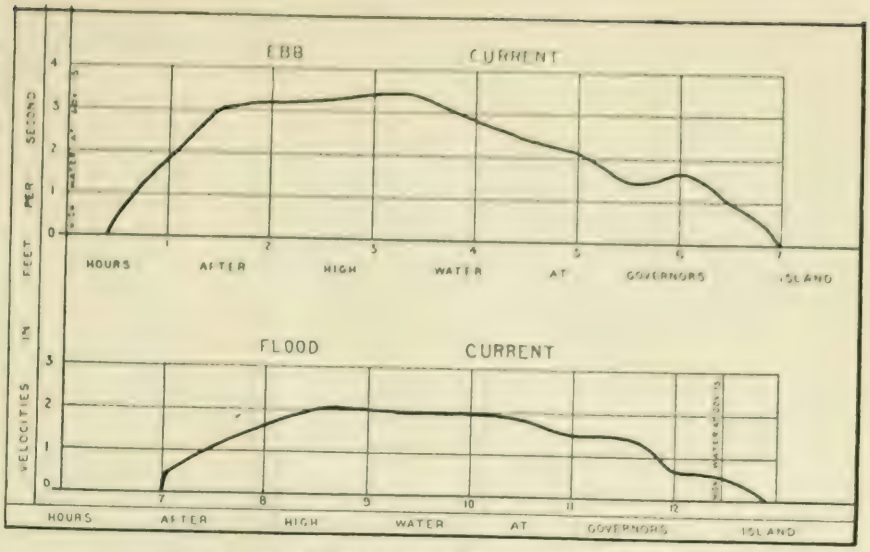
The current velocities in the bay are generally low and influenced by the wind; float experiments indicating a maximum channel velocity of 2.1 feet per second during the flood and 3.4 feet during the ebb. These velocities are sufficient to prevent deposits in the channels, but in the interior of the bay the velocities are too low to prevent the formation of deposits from domestic sewage or storm water.

An additional complication is presented by the probability that this bay will be developed for commercial purposes by dredging a channel around its margin, constructing bulkheads, etc. This will considerably increase the volume of water in the bay and therefore proportionately decrease the percentage of such water that will be replenished by tidal ebb and flow. Such development will also diminish the velocity of flow and thus increase the tendency for deposits to form, while the commercial use of the shores will render more essential the avoidance of deposits and other nuisances in the adjacent waters than is the case at present, with the lands above water around and in the bay largely marsh.

At the present time, nearly 1,000,000 bushels of oysters are planted annually in the bay, representing a business amounting to about $1,000,000 a year, while the raising of clams therein represents an income of about $8,000,000 or $10,000,000 a year. It is probable that this use of the

bay will be prevented by the federal and state health authorities. Aside from the question of shellfish contamination, however, the discharge of sewage into the bay would be objectionable on account of the formation of deposits at the bottom, the creation of putrefactive conditions in the water and of unsightly appearance of the water, due to turbidity, scum, or sleek, the effect on fish life, and the possible danger of infection to bathers.

To prevent the continuation and increase of the pollution and formation of deposits which has already been found to be occurring, the solids brought down in the sewage should be removed as completely as practicable. As this can be accomplished most effectively by the use of grit chambers and tanks or fine screens, the entire sewage of this area should in the future be treated by one or more of these devices, and the plans presented by Mr. Allen are outlined on this assumption.


EBB CURRENT
VELOCITIES IN FEET PER SECOND
HOURS AFTER HIGH WATER AT GOVERNORS ISLAND
FLOOD CURRENT
HOURS AFTER HIGH WATER AT GOVERNORS ISLAND

CURRENTS IN CHANNEL AT ROCKAWAY INLET.

Concerning the dangers that oysters and clams raised in sewage-polluted water may cause typhoid and other diseases, Mr. Allen cities the facts that in 1904, 21 cases of typhoid were traced by Dr. George A. Soper, to oysters floated near the head of Jamaica bay; the report of the United States Department of Agriculture that investigations made by it in 1911 showed that not only 27 cases of typhoid fever but 99 cases of gastroenteritis were caused by dangerously polluted oysters contained in this bay; and the results of the examination by the bureau of chemistry of the Department of Agriculture of oysters from Jamaica bay for presence therein of colon bacilli, such bacilli having been found in one-tenth dilutions of the shell liquor.

While the amount of dissolved oxygen at the inlet is at present satisfactory in amount, that along the shore becomes as low as 19 or 20 at certain points and certainly cannot be appreciably diminished without danger of objectionable conditions arising. To prevent the formation of odors that would result from the putrefactive conditions following a material depletion of the dissolved oxygen, sewage discharged into the bay more than two or three miles from the inlet should, besides having suspended matter removed therefrom, be subjected to some oxidizing treatment, such as filtration or direct aeration, that will render the effluent reasonably stable. No

MAP OF JAMAICA BAY AND AREA DRAINING TO IT.

Light lines in the bay show proposed lines of commercial development. Heavy solid lines represent suggested main sewers. Heavy dotted line is boundary of drainage area.

specific method of oxidizing the sewage is recommended in this report because of the probability that experiments with activated sludge, or possibly others, will develop methods for effecting this which will be preferable to any now available.

Mr. Allen believes that if the greater part of the suspended solids are removed from the sewage and the liquid portion entering the interior of the bay is oxidized so as to produce a reasonably stable effluent, the waters will be unobjectionable from any point of view, except that of oyster culture and bathing, which latter should in any case be discontinued in these waters.

(To be continued.)

CRACKS IN CONCRETE PAVEMENTS

Conclusions from Seven-Year Investigation by U. S. Office of Public Roads—Setting Contraction—Wetting and Drying—Waterproofing.

Specialists of the Office of Public Roads of the U. S. Department of Agriculture have recently concluded a seven-year study of cracking in concrete pavements, which has included measuring the amount of expansion and contraction caused by alternate wetting and drying and by temperature changes in concretes of various proportions of ingredients. The results are given in a report just issued by the department.

The report makes no attempt to apply the results to the practical side of road construction, although certain general conclusions drawn, it is said, may be capable of utilization by engineers. These conclusions are:

1. Neat cement, when allowed to dry, first contracts rapidly, then more slowly. The amount of contraction seems to vary with the cement, size of specimen, and condition of atmosphere in which drying takes place. The amount at 28 days is about 0.1 per cent and at 6 months about 0.2 per cent.

2. Mortar contracts on hardening in air and expands on hardening in water. The contraction in warm, dry air at 28 days is about 0.045 per cent for 1:2 and 1:3 mortar and at 6 months is 0.078 for 1:3 mortar and 0.085 for 1:2 mortar. The expansion in water is 0.01 per cent for 1:3 and 0.017 for 1:2 mortar at 28 days, and at 6 months 0.013 for 1:3 and 0.02 per cent for 1:2 mortar.

3. Both 1:2:4 and 1:3:6 concrete contract on drying in warm, dry air from 0.02 to 0.04 per cent at 28 days and from 0.04 to 0.07 per cent at 6 months. When hardening in water an expansion of about 0.01 per cent takes place at 28 days and 6 months in 1:2:4 and 1:3:6 concrete.

4. The richness of the mix of concrete seems to exert a small influence on the contraction; the richer the mix the greater the change in length.

5. Concrete alternately wetted and dried may be made to expand and contract owing to these causes. The expansion due to wetting is more rapid than the contraction on drying. The thoroughly dried specimens of concrete do not recover their original wet length when immersed.

6. Concrete stored in the outer air and exposed to the weather does not contract to the same extent as the above described specimens except under very dry conditions.

7. A waterproof covering, such as coal tar, prevents the rapid change in moisture content and greatly retards the expansion and contraction.

8. Reinforcement decreases, but does not prevent the shrinkage and expansion of concrete due to drying and has no effect on temperature changes. Reinforcement can not, therefore, entirely prevent cracks, but seems to distribute them and keep them small.

9. Concrete roads are affected by both temperature and moisture. When the drainage is good and the sub-base not wet the temperature effects seem to be most important. A wet sub-base may add to the temperature expansion by about 0.01 to 0.02 per cent. The restraining effect of friction at the base seems to be almost negligible when figuring temperature and moisture expansion and contraction. In very dry climates shrinkage due to drying must be added to contraction due to fall in temperature. A shrinkage of 0.04 per cent (one-quarter inch in 50 feet) is a safe allowance due to drying.

10. Temperature at time of construction of road should be considered in designing joints. Cold-weather construction requires a full allowance for temperature expansion and, on wet sub-bases, for moisture expansion also. Hot-weather construction theoretically requires no joints at all, even in wet sub-bases, as the temperature contraction exceeds the moisture expansion. However, the difficulty of keeping the cracks clear probably renders joints imperative.

The report is published as Bulletin 532 of the Department of Agriculture, which will send it free on application.

CITIES RESISTING RATE INCREASES.

A conference of mayors, city attorneys and corporation counsels of a number of New York state cities met at Albany on November 27th to consider the matter of the applications made to the state Public Service Commission by gas and electric companies for permission to change rates in the cities represented.

City attorney R. C. S. Drummond of Auburn outlined the efforts that the public utility companies are making to increase rates and make a consumers', service, or ready-to-serve charge. This charge, he claimed, would be a hardship on the small user of gas or electric light. There was a general discussion of the subject, after which the following resolutions were adopted:

Resolved, That the cities represented at this conference oppose the proposed consumers' or service charge.

Resolved, That the president of the New York State Conference of Mayors and Other City Officials be requested to appoint a special committee to assist all cities in opposing any application for increase in electric light, power and gas rates, or any increase in the cost of service of any of such utility companies.

Resolved, That this committee also investigate the subject of municipal ownership and operation of gas, electric light and power plants and make recommendations to the cities.

Resolved, That this committee be instructed to prepare and have introduced at the next session of the legislature amendments to the Public Service Commissions Law providing:

(1) That no rate charges by a public service corporation shall be increased until a determination by the Public Service Commission upon the merits.

(2) That no change in rates be granted to a public service corporation until it has satisfied the Public Service Commission that it has afforded the municipality affected a full and fair opportunity to examine its books, records and property.

(3) That in every case of an application for an increase of rates, the burden of proof throughout the proceedings be placed upon the public service corporation.

(4) Any other amendments necessary to give to the people the same protection now granted to the public service corporations under the law.

Mayor Burns appointed the following as members of the committee provided for: Corporation counsel Stewart Hancock, Syracuse, chairman; corporation counsel R. C. S. Drummond, Auburn; corporation counsel Boyd McDowell, Elmira; corporation counsel Owen C. Becker, Oneonta; corporation counsel H. L. Hooker, Watertown; corporation counsel E. W. Davidson, New Rochelle.

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Change of Address.

Subscribers are requested to notify us of changes of address, giving both old and new addresses.

Contributed Articles and Reports.

Contributions suitable for this paper, either in the form of special articles or as letters discussing municipal matters, are invited and paid for.

City officials and civic organizations are particularly requested to send to Municipal Journal regularly their annual and special reports.

Information Bureau.

Municipal Journal's Information Bureau, developed by twenty-one years' research and practical experience in its special field, is at the command of our subscribers at all times and without charge.

SERVICE CHARGES FOR PUBLIC UTILITIES.

As stated on another page, officials of a number of cities of New York state a few days ago, in taking action to oppose the increasing of rates for gas and electric light and power contemplated by public service companies in their cities, passed a resolution opposing a service charge by such companies. Whether or not the rates should be increased (and this would seem to be a matter to be decided individually for each city in accordance with franchise conditions and company finances), we believe that the officials are wrong in opposing the use of the service charge as a principle of rate making. It has been quite generally accepted as a correct principle in making water works rates, and we can see no reason why the same arguments do not hold good for the sale of gas and current.

It has been argued that the poor man using a small amount of water, gas or current should not be charged a higher price per unit used than is the (presumably) wealthier user of larger quantities; one reason given being that the manufacturing cost to the company or city per unit of material or current is the same in both cases. On the other hand, large consumers demand special rates and companies find it to their advantage to grant them. There is a logical reason for giving the large consumer more favorable terms, and this reason finds expression in the service charge. If we take the lowest rate as a basis, we may assume that the same rate is used for all classes, and that the difference between the average annual bill for any class, and what that bill would amount to if based solely upon such minimum rate, is the cost to the company of services necessarily performed other than the manufacturing of the water, gas or current.

Such services consist of furnishing and maintaining a meter, reading the same, keeping the consumer's account, making out bills and collecting, furnishing the mains and connecting the same to his premises, etc. Most of these cost almost as much for a small account as for a large, and the part of the charge for service rendered that is based upon these would therefore be entirely independent of the amount of water, gas or current used.

This would, of course, make the charge to the small consumer greater *per unit used* than to the large consumer. But to make the charge per unit used the same to each is to make the large consumer pay more than his share of the service costs. If a city wishes to do this to favor the poorer citizens, well and good. But we do not see how they can present any arguments for requiring a public service company to make such discrimination against its large consumers.

The service charge represents a real expenditure in rendering public service that must be paid by the consumers. The question is whether it shall be paid almost entirely by the large consumers, or shall be distributed among all in proportion to the service received by each.

CONCEALED JOINTS IN CONCRETE PAVEMENTS.

One of the arguments used against the concrete pavement is the apparent necessity for joints at intervals of 30 to 60 feet across the pavement and the slight jolting of traffic and objectionable appearance caused by such joints. Macon, Ga., has for several years been using what is known as the "concealed joint," and this method of construction was adopted last year by Fulton County, Ga. In this construction the joints are of the contraction type—that is, consecutive sections of concrete are separated by a thin strip of tar paper or other material which will prevent any bonding between the two sections, but no space is provided to allow for expansion; but the material used for effecting the separation of the sections is not brought to the surface but is stopped within about one-half inch of the same and the entire surface is made continuous. As the pavement dries out, a fine crack will ordinarily develop in the surface directly over the joint. In Georgia, at least, these cracks do not appear to open to any appreciable extent at any season of the year.

The advantage of this joint is that the entire surface is continuous and there is no jolting experienced by traffic in passing over the joints; also the fine cracks are hardly visible, as compared with the greater or less evidence of the bituminous joint, which shows a black streak where the expansion joints are brought to the surface. It is not only that the one-half inch or inch of width of the joint itself produces an unevenness of the pavement, but, owing to the fact that each section between joints is finished as a separate unit, there is apt to be a slight nonuniformity of general surface between adjacent sections where the surface joint is employed. Whether the advantage of this joint would be experienced as completely in a northern climate, where the temperature falls lower and contraction therefore is probably greater, is a question which should be carefully considered in connection with the advisability of adopting this construction in the northern states.

In Fulton county work, on one of the roads at least, if not on all, the contraction joints are placed at 35-ft. intervals. The construction of joints adds somewhat to the cost of a pavement, in that it makes a break in the continuousness of the work, requires a certain amount of

labor in setting the joint form, etc.; as a result of which, it may be said that the fewer the joints the less the construction costs. The amount involved, however, is comparatively small, and we have for some time considered the advisability of the use of a much greater number of joints than is common practice; for instance, joints every 10 feet transversely of the pavement. Our chief reason for suggesting this is that the entire amount of contraction and expansion in a given section of pavement between joints is concentrated at the joints (unless these are so far apart that motion cannot be carried throughout the entire length of the section, in which case cracks will appear intermediate between joints). That is, if joints are 50 feet apart, they will open approximately twice as wide when the concrete contracts as is the case with joints 25 feet apart. If this reasoning is correct, a pavement with joints 10 feet apart would show only one-fifth as much opening at each joint as where these are placed 50 feet apart. If the concealed joint construction be employed, we would probably have at each joint such a narrow opening formed by any ordinary contraction, due to either cold or drying out of the concrete or both, that it would be neither noticeable to the sight nor sufficient to induce a breaking down of the edges of the joint or crack. Experiments made indicate that if a pavement is kept damp for at least two weeks after being laid, the contraction due to drying does not exceed .02 per cent to .04 per cent, which amounts to about one-twentieth to one-fortieth of an inch in 10 feet. Theoretically the contraction due to a fall of temperature from 70° as the mean temperature during setting to 10° as a minimum daily average, would produce approximately the same amount of contraction, if not off-set by expansion due to absorption of moisture. We therefore have, as a maximum width of joint that can be expected with 10-foot intervals, one-twentieth to one-tenth of an inch, whereas with 50-ft. joints one-fourth to one-half inch would theoretically be possible. As a matter of fact, due to various causes, the actual contraction experienced in pavement is probably only about one-half of the theoretical amount, and we might accordingly expect that the cracks formed in the surface over joints formed at 10-ft. intervals would be from one-twentieth to one-fortieth of an inch and those at 35-ft. intervals in northern climates from about 1/6 to 1/12 of an inch. In a southern state, where the average temperature throughout a 24-hour period seldom falls below 35° or 40°, thus giving only about half the range indicated above, the width of opening would, of course, be less.

Both theoretical considerations and experience seem to indicate that there is no alternative between a multiplicity of small cracks or joints and the concentration of the contraction into a smaller number of wider openings. Such concentration is limited by the strength of the concrete employed, and 50 or 60 feet seems to be the maximum distance over which it can be effected. At the other extreme, it has been found that, by the use of reinforcement, the expansion can be distributed over a very great number of cracks more or less uniformly distributed throughout the pavement, but no amount or kind of reinforcement will entirely prevent the formation of these minute cracks, although they may be invisible and produce no serious openings in the pavement. This effect of reinforcement was observed by investigators of the Office of Public Roads, an abstract of whose report on their experiments is given this week in another column. It would seem logically also to be unavoidable when we consider that the reinforcement itself contracts and expands with temperature changes in nearly the same ratio as does concrete. It might be expected, however, that it would diminish the expansion effect due to absorption of moisture, and to this extent diminish the total amount of movement of the entire pavement as well as distributing such movement in a multiplicity of cracks.

CHANGE OF PUBLICATION DATE.

Subscribers will notice that the date of this issue is December 15th, instead of 13th—Saturday, instead of Thursday. This was not a mistake, but a change in the day of publication has been made and in the future Saturday will be the publication date of Municipal Journal. We will endeavor to secure the delivery of papers only one day later than heretofore, however.

MOTOR FIRE APPARATUS IN AMERICAN CITIES

Summary of Data Given in Tables Previously Published—Chemical and Hose with Ladders the Most Popular Kind of Apparatus.

A list of the motor apparatus in service in American cities was given in tabulated form in Municipal Journal for Nov. 29th and Dec. 6th. We have totaled the figures in these tables to determine the total number of pieces of each kind of apparatus reported by these cities. This is not all of the motor apparatus in use in the country, but the cities listed include practically all of the larger ones and probably a very high percentage of the smaller ones that possess motor apparatus, and we believe that the figures given include fully 75 per cent of the apparatus in service in the country.

The total number of pieces of apparatus in service tabulated is 4,217. The chemical and hose with ladders appears to be the most popular, both as to number of cities owning same and as to total number in service, 339 cities owning 688 of such wagons. The piece of apparatus owned by the next largest number of cities is the hook and ladder truck, 269 cities owning 573 of these. However, a larger number of chief's cars is in service, although owned by a somewhat smaller number of cities, 245 cities owning 608 of such cars. The next in order of number in service is the hose wagon, of which 510 are used by 187 cities. Following these in the order named are: Chemical and hose without ladders—347 used by 136 cities; gasoline pumping engine with hose—316 owned by 124 cities; tractors—259 owned by 68 cities; triple combinations—253 owned by 169 cities; gasoline-driven steam pumpers—229 owned by 44 cities; fuel or service wagons—133 owned by 51 cities; chemical engines—86 owned by 58 cities; gasoline pumping engine with chemical—59 owned by 33 cities; squad wagons—44 owned by 30 cities; repair wagons—43 owned by 35 cities; gasoline pumping engine without hose or chemical—41 owned by 19 cities; and 28 water towers owned by 20 cities.

These are the pieces of apparatus in actual service. In addition, there are in reserve the following pieces of motor apparatus: 31 chief's cars in reserve in 20 cities; 42 hose wagons in 16 cities; 18 hook and ladder trucks in 12 cities; 14 chemical and hose with ladders in 10 cities; 9 chemical and hose with ladders in 7 cities; 6 chemical engines in 4 cities; 6 gasoline-driven steam pumpers in 4 cities; 2 triple combinations in 2 cities; 2 gasoline pumping engines with hose in 2 cities; 2 tractors in 1 city; 1 squad wagon, and 1 water tower. This is about 3 per cent of the total number in use.

The steam pumper owned by Hartford, Conn., is steam-propelled as well, but all the others in this class are gasoline-driven. In some cities the motor chemicals are used as tractors for pulling old horse-drawn or hand-drawn hose wagons, and motor pumping engines are so used for drawing hose wagons or chemicals, etc. This

is indicated in several instances in the table by the foot notes, but there are possibly other cases where this use was not reported. In Pittsburgh, where 29 tractors are used, 7 are attached to hook and ladder trucks and 22 to steam fire engines.

The data given in this year's tables do not include any horse-drawn or hand-drawn apparatus. There is still considerable of this in use, but very little new apparatus of this kind is being purchased, except hand apparatus for factories, institutions and other private fire protection. The list of horse-drawn and hand-drawn apparatus published by us last year will probably serve fairly well for this year also, most of the change therein being due to providing tractors for towing horse-drawn apparatus, or the retiring of such apparatus from active service to make way for motor apparatus.

Five years ago there was very little motor apparatus in reserve, reserved apparatus being confined almost exclusively to horse-drawn apparatus supplanted by new motor apparatus of the same class. We now find, however, that the motor apparatus is beginning to be represented in the reserve list, probably due in many cases to the later installation of more recent and effective developments in such apparatus.

Totals of Pieces of Each Kind of Apparatus in Service and Reserve.

	No. of pieces in service	No. of cities	No. of pieces in reserve	No. of cities
Chief's cars	608	245	31	20
Chemical & hose, with ladders	688	339	14	10
Chemical & hose, without ladders	347	136	5	7
Hook & ladder trucks	573	269	18	12
Triple combinations	253	169	2	2
Hose wagons	510	187	42	16
Tractors	259	68	2	1
Chemical engines	86	58	6	4
Gasoline pumpers, with hose	316	124	2	2
Gasoline pumpers, without hose or chemical	41	19		
Gasoline pumpers, with chemical	59	33		
Gasoline-driven steam pumper	229	44	6	4
Fuel or service wagons	133	51		
Repair wagons	43	35		
Squad wagons	44	30	1	1
Water towers	28	20	1	1
Totals	4,217		134	

MILEAGE BY MOTOR FIRE APPARATUS

Average Number of Miles Run in a Year by Each Kind of Apparatus in Each of Several Hundred Cities.

One of the advantages of motor apparatus for fire service is the distance they can cover in a given time and in continuous operation. It is interesting, therefore, to know how many miles are covered in a year by each kind of apparatus in the different cities of the country. This information was included with that furnished to us last month by the fire chiefs of several hundred cities, and has been tabulated, the first half of the table being presented herewith. The second half will appear next week.

The distance covered will depend, of course, on the number of fires and size of the city, and can not be expected to be so great in small as in large cities. The population of the cities listed in this table were given in the table in the November 8th issue, and the number of pieces of each kind of apparatus in each city in those of November 29th and December 6th.

As might be expected, the chief's car in every case, we believe, covered more mileage than any other apparatus, between 1,000 and 5,000 miles in the majority of cases, or an average of about 3 to 15 miles a day. A synopsis of the mileage figures will be given next week.

AVERAGE MILEAGE PER YEAR MADE BY MOTOR FIRE APPARATUS.

City and State.	Chief's Cars.	Chemical & Hose With Ladders.	Chemical & Hose Without Ladders.	H. & L. Trucks.	Triple Combinations.	Hose Wagons.	Tractors.	Chemical Engines.	Gasoline Pumping Engine & Hose.	Gasoline Pumping Engine Without Hose & Chem.	Gasoline Pumper With Chem.	Gasoline Driven Steam Pumper.	Fuel or Service Wagons.	Repair Wagons.	Squad Wagons.	Water Towers.
Alabama:																
Brewton	....	....	....	....	....	100	....	....	....	....	....	....	....	....	....	....
Gadsden	....	1,000	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Selma	3,000	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Arizona:																
Nogales	....	50	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Phoenix	1,200	320	....	120	....	....	....	....	160	....	....	6	....	....	....	....
Arkansas:																
Ft. Smith	3,000	....	....	....	....	....	....	....	500	....	....	....	....	....	....	....
California:																
Alameda	2,000	....	75	120	....	....	100	625	....	265	....	200	....	....	....	....
Berkeley	10,000	250	....	525	....	250	....	....	....	....	....	....	....	....	....	....
Coalinga	....	....	200	....	....	....	....	....	....	....	....	....	....	....	....	25
Emeryville	....	....	....	....	....	....	....	25	....	....	....	....	....	....	....	....
Hayward	5,000	200	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Long Beach	2,500	....	....	160	....	205	....	820	245	....	....	205	....	750	....	....
Modesto	1,000	600	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Monrovia	....	....	....	....	350	....	....	....	....	....	....	....	....	....	....	....
Oakland	6,000	400	....	350	400	....	400	600	400	400	400	....	....	....	....	....
Palo Alto	....	....	....	....	....	....	....	600	....	....	....	....	....	....	....	....
Pasadena	1,000	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Pomona	....	....	....	150	....	....	....	190	190	....	....	....	....	....	....	....
Redlands	....	100	....	....	....	....	....	....	100	....	....	....	....	1,000	....	....
Richmond	3,000	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
San Leandro	5,000	800	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Santa Monica	4,000	350	....	....	200	....	....	....	....	....	....	....	....	....	....	....
Santa Rosa	....	200	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Watsonville	500	....	....	....	....	....	....	....	175	....	....	....	....	....	....	....
Whittier	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....

AVERAGE MILEAGE PER YEAR MADE BY MOTOR APPARATUS (Continued).

City and State.	Chief's Cars.	Chemical & Hose With Ladders.	Chemical & Hose Without Ladders.	H. & L. Trucks.	Triple Combinations.	Hose Wagons.	Tractors.	Chemical Engines.	Gasoline Pumping Engine & Hose.	Gasoline Pumping Engine Without Hose & Chem.	Gasoline Pumper With Chem.	Gasoline Driven Steam Pumper.	Fuel or Service Wagons.	Repair Wagons.	Squad Wagons.	Water Towers.
Colorado:																
Boulder	....	450	....	....	....	....	....	600	....	....	....	....	....	....	....	....
Ft. Collins	....	35	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Grand Junction	....	250	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Longmont	....	100	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Trinidad	10,000	....	4,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Salida	....	45	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Connecticut:																
Danbury	4,000	1,500	1,000	1,500	1,500	1,000	....	....	....	....	....	....	....	....	100	....
Greenwich	....	216	....	180	....	180	....	360	....	....	....	....	....	....	....	....
South Manchester	1,500	....	....	....	....	....	....	....	100	100	....	....	....	....	....	....
Torrington	....	100	....	....	....	....	....	....	100	....	....	....	300	....	....	....
Waterbury	5,000	500	....	400	300	400	....	700	400	....	....	....	....	....	....	....
District of Columbia:																
Washington	25,584	....	....	400	....	960	....	....	800	800	....	576	....	....	....	....
Florida:																
Daytona	258	60	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Sarasota	....	....	....	....	225	....	....	....	....	....	....	....	....	....	....	....
West Tampa	....	200	....	....	100	....	....	....	....	....	....	....	....	....	....	....
Georgia:											200					
Americus	....	200	....	150	200	150	....	....	....	....	....	....	....	....	....	....
Athens	750	325	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Brunswick	2,500	1,100	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Carrollton	....	350	350	....	....	350	....	....	....	175	....	....	....	....	....	....
Moultrie	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Newman	300	....	....	....	200	....	....	....	500	....	....	....	....	....	....	....
Rome	1,500	350	....	200	500	300	200	....	....	....	....	....	....	....	....	....
Valdosta	....	245	....	245	....	....	....	....	....	....	....	....	....	....	....	....
Idaho:																
Boise	1,600	400	....	....	....	....	....	1,000	350	....	....	....	....	....	....	....
Pocatello	1,000	300	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Illinois:																
Aurora	400	150	....	....	....	....	150	....	....	....	....	....	....	....	....	....
Belvidere	....	200	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Cairo	1,200	800	....	....	400	....	....	....	400	....	400	....	....	....	....	....
Champaign	5,000	200	....	100	....	....	....	....	150	....	....	....	....	....	....	....
Chicago Heights	3,000	250	....	....	....	....	....	....	....	....	....	....	....	....	....	....
East Moline	....	....	400	....	....	....	....	....	....	....	....	....	....	....	....	....
Elgin	3,000	125	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Evanston	2,500	....	....	....	450	....	....	....	....	....	....	....	100	....	....	....
Joliet	6,000	500	....	700	500	....	100	....	500	....	....	....	....	....	....	....
Macomb	....	....	....	....	....	100	....	50	....	....	....	....	....	....	....	....
Murphysboro	7,000	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Paxton	....	....	....	200	200	200	....	....	....	....	....	....	....	....	....	....
Pekin	....	....	....	....	450	....	....	....	....	....	....	....	....	....	....	....
Witt	....	500	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Indiana:																
Anderson	336	....	....	....	....	....	....	....	320	....	....	....	....	....	....	....
Elkhart	1,500	325	....	....	....	75	....	....	....	....	....	....	....	....	....	....
Frankfort	2,000	1,000	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Gary	150	100	100	150	....	150	....	....	....	65	....	....	....	....	....	....
Kendallville	....	....	....	....	65	50	....	....	100	....	....	....	....	....	....	....
Kokomo	450	200	....	100	....	....	....	....	....	....	....	....	....	....	....	....
La Fayette	5,000	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Richmond	2,225	215	....	150	....	....	....	....	....	....	....	....	....	....	....	....
Terre Haute	4,000	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Vincennes	500	250	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Wabash	....	225	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Warsaw	....	30	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Washington	....	40	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Iowa:																
Cedar Rapids	1,000	200	....	383	207	....	....	....	207	....	....	....	....	....	....	....
Council Bluffs	3,000	600	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Davenport	800	150	....	150	....	150	150	....	150	....	....	....	....	....	....	....
Denison	....	500	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Fairfield	....	350	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Keokuk	....	....	....	....	200	....	....	....	....	....	....	....	....	....	....	....
Mason City	1,000	180	....	80	80	....	....	....	....	....	....	....	....	....	....	....
Muscatine	....	200	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Kansas:																
Cherryvale	....	....	....	....	....	1,500	....	....	....	....	....	....	....	....	....	....
Fredonia	....	....	500	....	....	500	....	....	....	....	....	....	....	....	....	....
Independence	200	....	....	....	60	150	....	....	....	....	....	....	....	....	....	....
Kansas City	2,500	446	....	769	....	300	....	....	620	....	....	....	....	....	....	....

Newton	....	....	....	....	350	....	....	200	..	....	....	....	120	....	....	....
Olathe	....	250	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Parsons	3,000	300	....	....	....	....	....	3,000	....	....	....	....	....	....	....	....
Topeka	5,000	300	....	648	....	....	....	....	....	....	....	....	....	....	....	....
Kentucky:																
Harrodsburg	....	....	....	800	....	....	....	....	....	....	....	....	....	....	....	....
Henderson	3,000	....	....	100	500	....	....	....	....	....	....	....	....	....	....	....
Lexington	3,000	300	....	200	200	....	....	....	....	....	....	....	....	200	....	....
Maine:																
Augusta	....	....	....	....	600	....	....	....	....	....	....	....	....	....	....	....
Portland	500	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Skowhegan	....	200	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Massachusetts:																
Beverly	5,000	....	600	600	....	....	....	....	....	....	....	....	....	....	....	....
Brockton	6,000	120	....	100	....	....	100	....	130	....	....	130	....	....	630	....
Cambridge	10,000	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Gardner	2,000	175	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Gloucester	10,000	....	250	....	....	....	250	....	200	....	....	....	....	....	....	....
Hingham	300	....	....	....	....	....	....	....	300	....	....	....	....	....	....	....
Lowell	....	....	600	....	600	....	....	600	....	....	....	....	....	....	....	....
Ludlow	....	....	250	....	....	....	....	....	....	....	....	....	....	....	....	....
Lynn	5,000	....	....	....	....	....	....	....	300	....	....	800	....	....	1,400	....
Malden	1,200	221	200	200	....	....	....	....	....	....	....	....	....	374	....	....
Middletown	....	400	....	400	....	400	....	....	....	....	....	....	....	....	....	....
Milton	3,000	250	....	125	....	....	....	....	140	....	....	....	....	....	....	....
North Andover	....	100	....	....	....	....	....	....	....	....	....	....	....	....	....	....
North Easton	....	75	....	50	....	....	....	....	....	....	....	....	....	....	....	....
Quincy	5,000	650	....	500	....	....	100	....	....	....	....	....	....	....	....	....
Reading	....	350	....	300	325	....	....	....	....	....	....	....	....	....	....	....
Salem	3,700	175	250	....	....	....	....	....	150	....	150	....	....	....	....	....
Somerville	1,000	....	400	500	....	....	400	....	....	....	....	....	....	....	....	....
Taunton	1,000	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Waltham	2,000	200	....	....	....	....	....	....	110	....	....	....	....	....	....	....
Ware	....	....	....	....	250	....	....	....	....	....	....	....	....	....	....	....
Watertown	2,500	350	....	400	350	....	....	400	....	....	....	....	....	....	....	....
Wellesley	....	350	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Winthrop	650	400	....	400	....	200	....	....	....	....	....	....	....	....	....	....
Worcester	2,000	300	300	200	300	300	....	....	200	....	200	....	....	....	....	....
Michigan:																
Albion	....	90	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Alpena	240	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Ann Arbor	....	....	....	....	....	....	....	....	200	....	....	....	....	....	....	....
Iron Mountain	....	51	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Lapeer	....	....	....	....	1,000	10	....	....	....	....	....	....	....	....	....	....
Minnesota:																
Anoka	1,000	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Bemidji	....	75	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Chisholm	....	....	....	....	450	....	....	....	....	....	....	....	....	....	....	....
Cloquet	....	....	....	60	....	40	....	....	....	....	....	....	....	....	....	....
Detroit	....	200	....	....	200	....	....	....	....	....	....	....	....	....	....	....
Duluth	15,000	830	....	1,063	1,025	....	....	....	....	....	....	....	....	....	....	....
Minneapolis	6,365	413	....	264	500	....	900	....	....	....	....	....	....	....	1,400	....
St. Paul	....	....	400	200	....	400	250	....	250	150	....	200	....	....	2,500	....
Stillwater	....	....	....	....	....	....	....	....	125	....	....	....	....	....	....	....
Virginia	2,500	65	....	30	60	....	....	....	....	....	....	....	....	....	....	....
Winona	3,000	250	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Mississippi:																
Vicksburg	500	500	....	500	....	....	....	....	....	....	....	....	....	....	....	....
Missouri:																
Cameron	....	1,000	....	....	....	1,000	....	....	....	....	....	....	....	....	....	....
Carthage	....	150	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Maryville	....	400	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Moberly	....	215	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Monett	....	25	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Springfield	10,000	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Webster Groves	8,000	700	....	600	600	....	....	....	600	....	....	....	....	....	....	....
Nebraska:																
Norfolk	....	30	....	30	....	....	....	....	....	....	....	....	....	....	....	....
Nebraska City	....	100	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Nevada:																
Reno	....	....	300	300	....	....	....	....	300	....	....	....	....	....	....	....
New Jersey:																
Flemington	....	....	....	25	....	....	....	....	....	....	....	....	....	....	....	....
Freehold	....	....	....	....	....	....	....	300	....	....	....	....	....	....	....	....
Hackensack	3,000	300	....	250	....	....	....	215	....	....	....	....	....	....	....	....
Jersey City	4,000	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Kenworthy	....	....	....	....	....	15	....	....	....	....	....	....	....	....	....	....
Millville	....	100	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Roosevelt	....	....	1,000	....	....	....	....	....	....	....	....	....	....	....	....	....

[1]Aerials; [2]blocks.

(To be concluded)

The WEEK'S NEWS

Bridge Construction in Montana—Financing Roads in Pennsylvania—Health Work Coordinated in Cleveland—Cincinnati's New Street Lights—Cleveland's City Heat Plant Wants Higher Rates—Philadelphia's Police and Politics—The Halifax Catastrophe—New Jersey's Civil Service—Chicago Has Money Difficulties—Subways for Cleveland Economical Plan—Auto Headlight Regulation in Minneapolis—Grade Crossing Death Statistics.

ROADS AND PAVEMENTS

Montana to Improve Bridge Construction.

Helena, Mont.—Following a meeting here of the state highway commission, which approved of the work already done by the executive committee and its plans for the future, announcement was made that the officers of the commission believe the most important work that can be done next year will be to secure greater efficiency from the annual expenditure in Montana counties of three and a half million dollars on road and bridge work. From ten to fifty per cent better results can be obtained, it is believed, by the development of road and bridge construction and maintenance standards. It was definitely decided by the commission that all work done for the counties shall be free, expenses of surveys, making of plans and supervisory and advisory work to be borne by the state commission. It is stated that bridge plans and construction supervision have already been furnished by the commission to Beaverhead, Musselshell, Lewis and Clark, Ravalli, Missoula, Cascade, Valley, Madison, Deer Lodge, Lincoln, Rosebud, Mineral, Dawson, Gallatin, Broadwater, Big Horn, Teton, Sheridan, Hill, Yellowstone and Silver Bow counties. Expenses of the commission, from the time of organization up to the first of November, amounted to $18,000, it is stated.

May Not Transfer Highway Funds.

Carson City, Nev.—In an opinion given to R. K. West, state highway engineer, William McKnight, deputy attorney-general, holds that no part of the money raised by a county tax for highway purposes can be paid into the state treasury for the state highway fund and that no portion of the county highway tax can be used to reimburse any county fund from which the county commissioners have authorized an expenditure for state highway purposes. Several other opinions have been given recently by the attorney-general's office, among them being one to the effect that a private license will not be required for cars used by dealers for demonstrating purposes unless the cars are hired to the public. The question was raised by district attorney Atkinson, of Nye county.

Urges Tax Equalization for Highways.

Harrisburg, Pa.—According to highway commissioner J. Denny O'Neil, who has been making a thorough and extensive tour of the counties of Pennsylvania, much more road construction could be done in the state if county commissioners would revise their methods of fixing property valuations for taxation purposes; and, in addition, it would be possible for these counties to reduce the rate of taxation. The highway commissioner is much in favor of tax equalization. He said: "In many of the counties the assessments are not only too low, but they are not equitable. I find that there is no uniform system of fixing valuations for taxation purposes. In one district assessors will fix the valuation on a basis of 75 per cent actual value; in another, 60 per cent; in another, 80 per cent, and in another, 50 per cent. As a result the property owners in some districts pay more than their share of the taxes, because their valuations are higher than in other districts, while the tax rate is the same for the entire county—for county purposes. These inequalities can easily be remedied through creation of permanent boards of tax revision, or through the adoption of a system whereby fair and equal assessments can be made. A tremendous increase in the taxable valuation of many counties would result. I am interested in this proposition because it means so much for "the little fellow"—the small property holder, who is found frequently to be paying more than his share of taxes. It is comparatively easy for the assessor to fix the value of a property worth $2,500 or $3,000; and the figures returned to the county commissioners usually represent the real value of the small property. But in big properties—office buildings, coal lands and big plants—the assessor return a valuation far too low, because he is not an expert. Suppose in the outskirts of a city there is a small home assessed at $2,500 and worth $3,000. On the main street there is a building worth $200,000 and assessed at $110,000. The county tax rate is 4 mills. You will readily see that "the little fellow" paying his $10 is paying more proportionately than the "big fellow" paying $440. If the valuations had been made equitable the little fellow would pay $12 and the big fellow $800. As it is now, it seems to me, there is a great discrimination against the small property owner. If a fair and equitable valuation were made in many Pennsylvania counties you would find the valuation increased 40 per cent or 50 per cent over present figures. This would result in a great addition to the county revenue, on a more equitable basis—so great a revenue, in fact, that a substantial reduction could be made in the tax rate and the county would still have far more money than at this time." The assessment system referred to by the commissioner was given a tryout in Cambria county in 1913. A valuation of $43,000,000 was increased to $149,000,000; and the 5-mill tax reduced to 2.

SEWERAGE AND SANITATION

Public Health Council to Coordinate Work.

Cincinnati, O.—The Cincinnati Public Health Council has been organized at a meeting at which sixty organizations and agencies, the work of which is to be coordinated in the program of the new organization, were represented. Health officer Dr. J. H. Landis, in outlining the purpose of the council, said that every advance in public health work in Cincinnati and elsewhere had been made in the face of violent opposition, and that the work in the past had been more or less sporadic and undertaken only in the presence of what might be considered an emergency. "Lack of team work, duplication of effort and expense and the absence of coordination in the programs being followered by the various agencies," said Dr. Landis, "have combined to create a problem, the solution of which is to be the work of the Public Health Council. The solving of this problem will mean the readjustment of programs and budgets and radical changes affecting the material interests of many individuals, but if by putting in operation a joint program which will eliminate duplication of effort, reduce cost of administration and lower sickness, due to removable health hazards, its work will be constructive in character, anything short of which goal spells failure." The following chairmen of the divisional councils, representing the various activities of the organization, were appointed: medical relief, Dr. William H. Peters; industrial health, Anthony Mees; nursing, Miss Laura L. Logan; hospitals, Dr. A. C. Bachmeyer; housing, F. E.

Burleson; social hygiene, Dr. J. F. Williams; tuberculosis, Courtenay Dinwiddie; day nurseries, Mrs. J. O. White; recreation, F. P. Goodwin; infant welfare, Mrs. Ada Stokes; waste, W. C. Folsom; mental hygiene, Prof. Burtis B. Breese. The divisional councils will be organized with representatives from the various agencies throughout the city.

Infant Mortality in Ohio.

Columbus, O.—In Ohio last year a total of 11,059 babies died before completing twelve months of life, according to infant mortality statistics just completed for 1916 by Dr. J. E. Monger, state registrar of vital statistics. This is approximately one death out of every eleven births. One-seventh of all deaths in the state were of infants. As usual the figures show more boys born than girls and a higher infant mortality rate among boys than among girls. This was true in Ohio last year. The number of male infants who died during the year exceeds the number of females by 1,309. Noble and Jefferson counties have the highest rate of infant mortality, one out of every six children dying before completing its first year. In Mahoning, Noble, Jefferson and Summit counties nearly one-fourth of all deaths are of infants under one year of age. Henry county shows the lowest rate, there being only one death for every twenty-nine births, and in Wyandot county only one death for every twenty-three births. Both of these are rural counties.

Closing Schools During Epidemics.

Hartford, Conn.—A recent bulletin of the state department of health gives the following advice to local health officers: "The practice of closing schools upon the outbreak of contagious disease is still followed by some health officers. This method of controlling disease is less efficient and more expensive than the method of individual examination. It is appreciated that public sentiment often demands the closing of schools and that official shortsightedness at times makes it difficult for the health officer to act as he thinks best, but the health officer should put the facts squarely before the people and insist upon official support. For example, if a school of 100 pupils is closed for ten days because of an outbreak of diphtheria, the health officer should show that the average cost per day of educating a child is twenty-five cents and that by closing the schools, a loss of $250 would be sustained. For one-fifth of this sum, sufficient assistance could be employed to examine and 'culture' every child. Those afflicted with the disease and the carriers could be excluded and the school allowed to continue its sessions. Add to this information that the closing of schools as a method of control is quite often unsuccessful, while the method as described invariably brings results. Of course it is sometimes necessary, where serious outbreaks are threatened, for the health officer to close the schools for a day or two until he can arrange for the admission of pupils under control."

STREET LIGHTING AND POWER

New Lights Installed.

Cincinnati, O.—Progress is being made on the installation of new electric boulevard lights, contracts for the system having been recently awarded by the board of control, through service director Hornberger to the Union Gas and Electric Company at its bid of $60 per year per light. The standards were approved by the board of control and also by the city planning commission. They are of a new design, the work of city electrician W. O. Kleine, who received the co-operation of the Western Electric Company in working out the details of the standard and globe. The standard is slightly over thirteen feet high from the ground to the light filament. It weighs 400 pounds. The principal feature is in the globe. In the lights being replaced, the globe is topped by a metal ventilator. The plans for the new lights do not provide for a metal ventilator, but the top will be of glass, so made as to well resist heat. This will cause the light to show its complete outlines when illuminated, as in daylight. The lights are spaced eighty feet apart on both sides of the street, with four lights at street intersections, one at each corner. Those in the square are placed opposite each other. There will be a total of 913 lights. The light will be equally diffused and distributed. The lamps are 615 candle power or about 50 per cent. stronger than the lights being replaced. The standards are made by a Cincinnati firm and are known as the "Cincinnati standards." The lights are to be installed in an unusual manner. The city officials have arranged a plan of having these put in without tearing up the streets on thoroughfares where resurfacing has just been completed. All connections will be made through cellar-ways under the sidewalks, and where there are no cellars the excavation will be made in the sidewalk. At street intersections a conduit will be driven through the street beneath the surface in such a way as not to interfere with the surface.

Vote in Favor of City Buying Plant.

Eaton Rapids, Mich.—In spite of considerable interest taken in the election, less than two-thirds of the normal vote was cast in the regular election at which a proposition to bond the city $30,000 for the purpose of buying the Smithville water power plant was referred to the voters. The proposition carried by a majority of 59 votes.

City Heat Plant Loses—Asks Higher Rates.

Cleveland, O.—Because it is costing Cleveland taxpayers thousands of dollars every year to supply less than two hundred customers of the city with heat from the Fairmount station, at 35 cents a thousand-pound unit, utilities director Farrell has asked the board of control to authorize the doubling of the rate. According to the department of public utilities, the plant of the city, which was established four years ago at a cost of $300,000, has lost money from its inception on account of insufficient charge for service. The plant, heat and light commissioner Davis said, supplies steam heat to 196 buildings within a radius of a few blocks from the Fairmount station. He said some of these structures are apartment houses and business blocks. Water commissioner Dusinberre declared the plant since it was opened under the Baker administration had cost the city $115,195 more than its revenue yielded, due to the inadequacy of the existing rate.

FIRE AND POLICE

Philadelphia Police Force Threatens Strike.

Philadelphia, Pa.—Following protests to the city officials and mass meetings, the city's policemen have threatened to "resign in a body" on New Year's day unless conditions to which they have been long objecting be changed. Eight hundred policemen, representing the membership of the Patrolmen's Benevolent Protective Association in every police station in this city, at an all-day protest meeting, solidly voted "resignation as a body" unless mayor Smith and councils take immediate action on this organization's demands to eliminate politics from the administrative affairs of the department of public safety. Director Wilson of the department of public safety has dismissed the president of the patrolmen's association. The association calls for Mr. Wilson's dismissal, and that of two others, and for the reorganization of the police pension fund. "We must have a man at the head of that who is not controlled by politicians," says the dismissed president. The police say that they can produce affidavits to show that "the men at the top dealt with us through trickery." They are sure that Philadelphians "will stand behind this fight for our rights when they know what is being done to keep ward leaders and district captains in control of the police." An election was about to be held at the time of the protest for the purpose of designating delegates of the men to the board controlling the pension fund. The protective association was successful in electing a small majority of the delegates, but the methods of their superiors in voting the proxies of men who are sick and away at camps aroused the men to a still higher pitch

of anger. Direct charges are made by the policemen that their superiors tried to steal the election. It is he contention that director of public safety Wilson attempted to gain control of the pension fund. It was said that powers of attorney left by policemen with their superior officers so that salaries could be collected were used as proxies, with the result that hundreds of votes were wrongfully cast for administration candidates. The demands of the policemen include:

Remove politics from police duty.
Permit policemen to elect their own delegates to the Pension Fund as provided by law.
Abolish open voting for Police Pension Fund delegates as adopted to keep sergeants and lieutenants friendly to the administration in charge of the fund books.
Obtain a full accounting of the Pension Fund and make public all the accounts.
Recognition of the Patrolmen's Benevolent Protective Association by the Mayor and the Department of Public Safety.
Increase of salary and the establishment of a pay schedule giving patrolment $1,400 a year instead of a daily pay of $3.25, and sergeants $1,600 a year.
Abolition of the "ginks," or police spies, detailed to prefer charges against patrolmen who refuse to abide by political orders.
Abolition of all political assessments.
Abolition of station house assessments.
Reorganization of the trial system with full publicity of charges and open inspection of minutes of trials.
Reorganization of Police Pension Fund, system to provide for a president chosen by delegates from the ranks of the department.
Retention in the department of men actively associated with the organization of the Benevolent Association.

The seriousness of the situation has been increased by the attitude of the 7,500 members of the home defence reserve. It is known that the members of the reserve are not anxious to be called as strikebreakers.

Police Chief Killed in Fire.

St. Hyacinthe, Que.—The Hotel Dieu hospital was destroyed by fire, but all of the inmates, about 1,000 in number, were removed to safety. Chief of police Foley lost his life while assisting others to escape. Many of the inmates suffered from exposure to the zero weather until accommodations were found for them in houses throughout the town. The hospital population included aged persons and children as well as the sick. The institution consisted of three stone buildings erected at a cost of $600,000.

City Cleaned Up After Federal Threat.

Columbus, Ga.—Following the appeal of men sent to Columbus by the war department, and solicitor general C. Frank McLaughlin, representing the Muscogee county grand jury, to wipe out the segregated district as a patriotic move in this great crisis, so that the soldiers of the United States army will not become non-effective by double debauchery, the board of police commissioners issued an order to chief J. Tom Moore, instructing him to begin immediately with issuing orders to the inmates in that section of the city to vacate the lewd houses at once. Threatening to place provost guards on every road leading into Columbus, and not allowing soldiers from his camp to come into the city unless the segregated district is cleared of the women, colonel S. B. Stanbury, provost marshal of Camp Sheridan at Montgomery, addressed the police commissioners, stating that Columbus was not "a fit place for the United States soldiers to come into."

Another Big Waterfront Fire.

New York, N. Y.—Six buildings in the great shipbuilding plant of the Morse Dry Dock and Repair Company, extending along the south Brooklyn waterfront, were destroyed by a night fire, perhaps of incendiary origin, which caused damage estimated at $500,000. Because this plant has been employed exclusively on government work of great importance since this country entered the war, it has been heavily guarded. One company of soldiers has been quartered in the yards and kept constantly on duty. Guards have been kept busy scouring the district back of the yards for enemy aliens. Motor boats have been kept continually patroling to prevent incendiary attempts from the water side. Attempts to plant bombs in this yard have been reported previously. After sweeping through the carpenter shop, where it began at about ten o'clock, the blaze spread to several wooden buildings, which had been erected to shelter the soldiers guarding the plant. The fire next attacked the restaurant for employees. As fire-fighting apparatus began to arrive in response to four alarms, other buildings took fire. The fire department, which was under the direction of deputy fire chief John O'Hara, began to concentrate on saving a brick storage house 150 feet long by 75 feet in width, where several thousand gallons of oil were stored. A score of streams of water were kept pouring over the walls to prevent the flames from burning buildings less than 100 feet away from heating the oil inside the storage warehouse to the combustion point. Just before midnight, however, the oil storage building took fire and began to burn fiercely. The firemen had to give over attempts to save the oil and turned their attention to the saving of other buildings. Before one o'clock the fire was declared to be under control and no other buildings had been reached. Soldiers assisted in saving valuable property.

The Halifax Disaster.

Halifax, N. S.—Known dead numbering 1,280, wounded numbering 6,000, hundreds of missing and 25,000 rendered homeless is the toll of a munition ship explosion, which has destroyed a large part of the city. According to reports, the disaster followed the collision, due to mistaken signals, of a Belgium relief ship with a French steamship carrying a thousand tons of explosives. The munitions ship carried benzene, which caught fire after the crash. The crew attempted to put out the flames, but gave up and tried to make for shore. Fifteen minutes later a tremendous explosion shattered half the city—that part near the narrow peak of the channel, where the ship was and which is low land. Fire swept the district. All buildings in a large area were destroyed and thousands of dead and wounded were buried under the ruins. The lighting service of the city broke down and darkness made relief impossible. Three fierce blizzards following each other still further shattered attempts to relieve the stricken city. Cities in Massachusetts, Maine, New York and many other cities in the country rushed relief trains with supplies and doctors. The suffering was indescribable. Refugees and wounded had to be kept in houses without windows through bitter snowstorms. The weather turned relief workers and searchers back under cover and it was four days before the work could be organized.

Fireman Dead After Collision.

San Francisco, Cal.—Three firemen were hurt and three others seriously injured so that one died later as a result of a collision when a United railroads' street car smashed into a hose wagon as it was crossing a street corner on its way to a night fire. The seriously injured were captain John Riley, John Breen and Joseph Coleman, hosemen. The latter died. Both wagon and car were running at high speed, the fire apparatus sounding its gong at full blast. The wagon was squarely struck. Although the wagon was demolished, the horses drawing it were uninjured, but their harness was torn to pieces. Battalion chief Maxwell, who was following in a runabout, took the injured men to the hospital. According to the firemen the car was traveling at the rate of forty-five miles an hour at the time of the crash, without making any reduction of speed for the crossing. According to lieutenant Hensley, who was hurt, the motorman, who was arrested, is the same man who drove a car into truck No. 10 seven months ago, injuring several firemen. One of the men hurt in that accident is still in the hospital.

Segregated District Illegal.

Houston, Tex.—The supreme court at Austin has held void the ordinance of the city of Houston creating a "reservation" or segregated district. The court in its opinion, written by chief justice Nelson Phillips, follows the decision rendered in the case of Spence vs. Fenchler, from El Paso county. It was in the case of J. W. Baker against Sadie Coman et al, from Harris county, that the court rendered its opinion. The supreme court reversed the decision of the court of civil appeals and affirmed that

of the district court of Harris county. In this case Baker had obtained an injunction in the district court for the suppression of resorts, but the court of civil appeals dissolved the injunction. Under the opinion the injunction issued by the district court stands.

GOVERNMENT AND FINANCE

Reorganization of State Civil Service.

Trenton, N. J.—Classification and standardization of offices and readjustment of salaries to fit the work done are recommended in the report on the civil service system of New Jersey, submitted to the State Civil Service Commission by J. L. Jacobs of Chicago, who was appointed by the governor last spring to arrange places in the service according to the work performed. There are 2,568 posts in the state civil service, with an aggregate payroll of about $2,400,000 a year. The report recommends salary changes aggregating an increase of about $47,000 a year; but this will be balanced by starting the salaries of holders of certain posts at the minimum instead of beginning a new appointee at the pay which his predecessor was receiving when he ended his service. The report, which is to be embodied in legislative bills now being drawn, reduces the 911 titles for the 2,568 posts to 507, and recommends that the legislature establish the principle of uniform compensation and salary advancement based on service, efficiency and seniority, and for uniform hours of work, vacations, and sick-leave allowances. It also recommends the creation of a Bureau of Personal Service Standards and Records for the purpose of maintaining the classification plan and keeping a record of the service and efficiency of all employes. All officers are to be divided into nineteen functional groups, and in each of these the posts are graded according to responsibility, experience, and skill, with definite stepping stones of promotion from one grade to another.

City Laborers Get Raise.

Portland, Ore.—The city council, acting as a budget committee, has decided that all laborers in the employ of the city shall receive an increase of 25 cents a day. The proposed increase also will affect foremen, park keepers and others working on a per diem basis. Laborers who now receive $3 a day will get $3.25 under the new arrangement; park helpers will be paid on the same basis; park keepers will be raised from $3.50 to $3.75; assistant park keepers from $3.25 to $3.50; gardeners from $3.50 to $3.75; attendants of comfort stations, $2.50 to $2.75. In the park administration office, the position of engineer is abolished and the salary of superintendent is increased from $175 to $200 a month. The position of assistant superintendent at a salary of $115 was created. There were several slight increases in the salaries of the clerical force, and the keeper of Benson park will receive an increase from $90 to $100 a month.

Chicago in Financial Straits.

Chicago, Ill.—Unless a special session of the legislature gives Chicago additional powers toward raising funds the municipality will face a condition practically amounting to bankruptcy next year. The seriousness of the situation was pointed out in a statement from city controller Eugene R. Pike and alderman John A. Richert, chairman of the city council finance committee. The statement shows that the city must raise $7,500,000 next year in addition to what it receives from all corporate purposes or greatly reduce all municipal operations. The idea of increasing the payrolls rather than cutting them was suggested. Part of the statement, which was sent to all civic organizations in the city, was: "The city of Chicago will face a shortage in its corporate revenues for 1918, due to the failure of renewal of licenses of a large number of saloons and other miscellaneous establishments. The loss on this account to the city will undoubtedly reach $2,000,000. This shortage may be increased by the loss in the proceeds of taxation of more than $700,000 unless the findings of the lower court are reversed by the supreme court. Due to special conditions arising on account of the war situation, the department of police has detailed approximately 500 patrolmen to special purposes, and that department has appealed to the city council for 1,000 additional patrolmen for the year 1918. There is also a necessity for an increase in the fire fighting forces of the city. The health protection forces of the city should also be augmented. These increases are imperative. The city's employes have generally appealed to the city council for increased rates of pay. Materials and supplies used in the operation and maintenance of the city's activities have increased in cost beyond expectation. Briefly summarized, the losses of revenue to the city and the increased cost of operation are as follows:

Loss in licenses	$2,000,000
Loss in taxes	700,000
Increased cost of supplies	400,000
Demands for increased wages	1,300,000
Extra cost of new functions authorized by bond issues	600,000
Additional police	1,000,000
Additional firemen	500,000
Salaries of 600 enlisted city employes	500,000
Total	$7,500,000

"In the face of all the foregoing demands the revenue of the city from taxation has only increased within the last three years on an average of about $187,000 a year. Unless financial relief is forthcoming, the city controller and the city council will be forced not only to deny any added municipal service which is needed, but will be required to reduce present inadequate police, fire, and health protection service, garbage, ash, and street cleaning service, maintenance of public works, and so forth." The organizations are asked to offer their aid toward having Gov. Lowden call a special session of the legislature.

TRAFFIC AND TRANSPORTATION

Order Straight Five-Cent Fare.

Bridgeton, N. J.—The decision of the Bridgeton and Millville Traction Company to abandon the sale of tickets at the rate of six for twenty-five cents and fifty for $2 has been sanctioned by the state public utility commission at Trenton. The abolition of these special rates was suspended by the board pending a determination as to the reasonableness of the proposed increase, which will affect about 74 per cent of the road's patrons. The commission says it is not confronted in this case by the question of contract obligations, such as were discussed in cases of the Trenton and Mercer County Traction Corporation and the Northampton, Easton and Washington Traction Company. The decision in the present case rested solely upon the reasonableness of the proposed increases. The commission found that the company does not now obtain and has not for many years received a fair return upon its investment, and even by foregoing the payment of dividends has been unable to acquire sufficient funds for the proper maintenance of its lines. It was also shown the company operates through sparsely settled districts, and its revenues have shown little, if any, increase during a long period of years. In fact, the earnings of the company for the year ended June 30 last were less than those for the year ended June 30, 1907. On the other hand, operating expenses have increased about $12,500 a year. Of this increase, $8,000 has been in wages.

Economy of Subways for Cars.

Cleveland, O.—Data just compiled by street railway commissioner Sanders for the newly appointed rapid transit commission, of which he is a member, shows that the building of a subway system downtown would save 195,568 man-hours of labor annually, or $65,613 in salaries of conductors and motormen alone in present car schedules. This saving would be effected by increasing the speed of cars, according to Sanders, and this could be done by operating cars through three subways in a comparatively small district. To back his assertion of saving, Sanders presents figures showing a comparison of the speed attained by Cleveland street cars in the

district with the speed of Boston cars operating through subways in a downtown district of the same area obtained by many days of careful investigation and traffic checks in Boston and Cleveland by skilled engineers. The table prepared by Sanders shows that cars operate a distance of 3,548,432 miles annually in Cleveland through the downtown district bounded by East and West Ninth streets, Lakeside avenue and Central market. It requires 821,359 hours of labor annually by conductors and motormen to operate the Cleveland cars. In Boston, conductors and motormen work 625,791 hours to cover the same distance in a downtown district of the same area. The Boston subways save 195,568 hours of man labor. In Cleveland the average wage paid motormen and conductors is 33.55 cents an hour. The product is $65,613, which represents Sanders' estimate of the saving. In the morning rush hours here, the average speed is 8.13 miles an hour, as compared to 10.95 miles an hour in Boston. In the afternoon rush hours, however, when the stores and factories turn out thousands of employees in both cities to be carried home, the speed drops. In Cleveland the rate is 6.60 miles an hour, and in Boston it is 7.85. Cleveland cars travel a total of 1,570,651 miles annually during the rush hours in the small downtown district, and the hours of man labor is 357,927, as compared to 281,691 in Boston, where there is a saving of 76,236 hours of labor each year during the rush hour periods alone.

Utilities Commission Controls Interurbans.

Austin, Tex.—The state railroad commission has issued an order assuming jurisdiction over all of the interurban railway companies operating in Texas. This action, it was said, is due to the commission being advised of an advance in freight and express rates by the interurbans. The commission proposes to regulate in the future all freight and express rates in operation by the interurbans.

Headlight "Dimmer" Law in Effect.

Minneapolis, Minn.—The city's new ordinance regulating headlights on automobiles, motorcycles and other vehicles is now in effect. The ordinance says: "All motor vehicles used or operated upon any street, alley or highway in the city of Minneapolis during the time from one hour after sundown to one hour before sunrise of each day, shall have thereon at least two lights visible from the front on every such motor vehicle that is not a motorcycle, and one light visible from the front on every such motor vehicle that is a motorcycle, and all such motor vehicles shall have at least one red light visible from the rear, and all such front and rear lights shall be visible at a distance of not less than two hundred feet from the vehicle on which they are placed, and during said period from one hour after sundown until one hour before sunrise of each day it shall be unlawful for any person, copartnership or corporation to use or cause to be used any motor vehicle run or operated on any public street, alley or highway in the city of Minneapolis any lighting device equipped with a reflector unless the glass in front of such light be so etched, ground, frosted, colored, molded or constructed that the lighted filament shall appear blurred or all light emitted therefrom shall be diffused and free from brilliant luster. It shall be unlawful for any person, firm or corporation to operate or manipulate upon the streets, alleys and public places in the city of Minneapolis any detached or dirigible spot light or search light except for the purpose of searching for and finding house and building numbers and road and street signs and for other emergency purposes. The provisions of this section shall not apply in case of vehicles used by or in the service of the hospital, police or fire departments of the city." The civic and commerce association has approved the ordinance and its vigorous enforcement and has issued the following statement advising as to methods of compliance: "Obedience to this law requires no great effort. While the law demands that all glare be eliminated from headlights, this can be accomplished through simple methods, such as the use of soap, paint, paste, etc., or through the substitution of blue or amber glass for plain glass. Those who wish to avoid the possible imperfections of home mechanics can obtain patented lenses from some twenty manufacturers. It has been found that even superior lenses will, if the lamps are tilted or out of focus, sometimes produce a dangerous glare, which, of course, means prosecution. This ordinance cannot be properly called a dimming ordinance, because it requires that the lenses be treated. The mere act of shutting off bright lights and using only the dim lights is not sufficient. Dimming does not effectively reduce the risk, because it is difficult for a pedestrian crossing the street to see a car with lights dimmed, and on the other hand the driver behind dimmed lights has little opportunity to see the pedestrian or other unlighted objects ahead."

Valuation of Milwaukee Railways.

Milwaukee, Wis.—The state railroad commission has received from its engineering staff, after more than three years of work, a report on the reproduction cost of the physical properties of the Milwaukee Electric Railway & Light Company and Milwaukee Light, Heat & Traction Company. This valuation was made as of Jan. 1, 1914, and showed a reproduction cost on that date of $37,319,297 for the property of the two companies. The capital expenditures of the two companies during the intervening years up to Jan. 1, 1917, were $3,206,700. The reproduction cost on Jan. 1, 1917, would accordingly be $40,525,997. This figure does not include any allowance for working capital or going value. The companies had cash and accounts receivable of $1,174,000, which, when added to the reproduction cost, gives a total valuation of $41,699,997. Against this valuation of $41,699,997 the company had outstanding in the hands of the public and owned by the Wisconsin Edison Company, $41,006,000 par value of securities, or about $694,000 less than the reproduction cost of the properties. In order to determine the present value of debt represented by bonds sold at a discount, the unamortized discount may be deducted therefrom. If this is done, the present value of bonded debt and outstanding capital stock and notes is $39,500,856 as of Jan. 1, 1917, or $2,199,141 less than the reproduction cost of the properties.

Grade Crossings Cause Many Deaths.

Washington, D. C.—A recent report by the committee on grade crossings and trespassing on railroads of the National Association of Railway Commissioners states that 2,000 persons are killed each year at these crossings, and that there are about 200,000 grade crossings in the United States. This statement is made concerning twenty-two states: "Of the twenty-two states, only nine reported the amount of money expended for elimination work. These figures are so eloquent that we cannot forbear quoting them. For instance, in Illinois the cost of elimination work done is reported as $55,570,205; in Massachusetts, $11,962,030; New York, about $44,000,000; New Jersey, $6,000,000; Vermont, $1,003,625; Maine, $216,804; Missouri, $330,000, with $967,000 unexpended for work already ordered; Oregon, $136,042, with an additional $633,375 to be spent, and Virginia, $66,317." The report says that out of 10,785 trespass accidents of 1914, 3,437 happened to those between the ages of 21 and 30 years. "In other words," says the report, "in these 3,437 accidents some 3,000 men within the draft age were killed and injured. The country has an economic interest in the life and health of every individual of the 10,000 who are killed and injured, regardless of whether they are or are not of military age, but, after all, humanitarian rather than economic reasons make the stronger appeal to us."

Jefferson City, Mo.—Accidents at grade crossings in this state are increasing despite added protection and educational campaigns by the railroads. T. H. Bradbury, secretary of the state public service commission, has issued a report covering accidents during the fiscal year ended June 30, 1917. He says that during the fiscal year ended June 30, 1916, there were 22 accidents caused at grade crossings, resulting in death to 6 persons and injuring 43. For the fiscal year ended June 30, 1917, however, there were 30 accidents resulting in death for 19 persons and injuring 48.

THE MUNICIPAL INDEX

In Which Are Listed and Classified by Subjects All Articles Treating of Municipal Topics Which Have Appeared During the Past Month in the Leading Periodicals.

It is our purpose to give in the second issue of each month a list of all articles of any length or importance which have appeared in all the American periodicals and the leading English, French and German ones, dealing more or less directly with municipal matters. The Index is kept up to date, and the month of literature covered each time will be brought up to within two or three days of publication. Our chief object in this is to keep our readers in touch with all the current literature on municipal matters. In furtherance of this we will furnish any of the articles listed in the Index for the price named after each article, except that where an article is continued in two or three issues of the paper, the price given is for each of said issues. In addition to the titles where these are not sufficiently descriptive or where the article is of sufficient importance, a brief statement of its contents is added. The length also is given, and the name of the author when it is a contributed article

ROADS AND PAVEMENTS.

Asphalt:

Asphalt Block Pavements on Sand. Method of laying and detailed cost of construction in Savannah, Ga. 500 words. Municipal Journal, November 22. 10 cts.

Assessments:

The Apportionment and Assessment of Paving Costs in New Orleans. Method where practically the entire cost is borne by the property owners. 1,000 words. Good Roads, November 3. 10 cts.

Bituminous:

Bituminous Macadam by the Penetration Method. From a paper by I. W. Patterson, Chief Engineer of Rhode Island Board of Public Roads. 4,000 words. Good Roads, November 24. 10 cts.

How a Tar Mat is Applied to Concrete Road Base in Maine. 600 words. Engineering News-Record, November 29. 15 cts.

Brick:

Old Brick Resurfaced with Thin-Base Monolithic Brick. Use of 3-inch block proves satisfactory. On future work the experimental use of a 2-inch block is proposed. By H. H. Edwards, Highway Engineer. 4 ills. 1,200 words. Engineering News-Record, November 1. 15 cts.

Tests Show Advantages of Laying Brick Directly on Concrete Base. Research work at University of Illinois justifies the assumption that the strength of such a slab is the same as that of an equal thickness of concrete. By C. C. Wiley, instructor in highway engineering. 5 ills. 3,000 words. Engineering News-Record, November 1. 15 cts.

Concentration of Expansion Stresses Due to Imperfect Grouting the Cause of Brick Pavement Failures. By C. C. Wiley, instructor in highway engineering, University of Illinois. 3 ills. 1,000 words. Municipal Engineering, November. 25 cts.

Concrete:

Reinforced Concrete Pavement with Bituminous Block. By H. J. Hanmer, City Engineer of Gloversville. 1 ill. 1,500 words. Cement & Engineering News, November. 20 cts.

Concrete Highway Construction in Illinois. Equipment employed by contractors in Vermilion County. Graders, scrapers, industrial railway and unloaders used. No shoveling of aggregate from cars to mixers. Engineers keep records. 5 ills. 4,000 words. Municipal Journal, November 22. 10 cts.

Spool Roller for Concrete Pavement. By Frank Yocum. 1 ill. 250 words. Municipal Journal, November 15. 10 cts.

Board Float for Finishing Concrete Streets. 1 ill. 200 words. Municipal Journal, November 15. 10 cts.

Pipe Used to Roll Concrete, Rolling Transversely. 1 ill. 300 words. Engineering News-Record, November 1. 15 cts.

Expansion and Contraction of Concrete Roads. Change in moisture content. Effect of variation in temperature. Conclusions, based upon expansion and contraction measurements. 1,500 words. Engineering and Contracting, November 7. 10 cts.

Plans to Cut Paving Gang in Half. With train of steam roller, derrick, traveling bins and paving mixer wheeling gang is eliminated on concrete pavement and pavement base construction. 2 ills. 1,000 words. The Contractor, November 9. 10 cts.

Building State Aid Concrete Road Near Grand Rapids, Mich. Stiff concrete is used, floated by hand and finished with a belt. Teams and motor trucks do the hauling. 1,500 words. Engineering News-Record, November 29. 15 cts.

Wayne County Board Reports on Concrete Roadwork. Two-course construction still practised because of the scarcity of good pebble aggregate and road shoulders macadamized. 1,200 words. Engineering News Record, November 22. 15 cts.

Heavy Screed Gets Quick Results on Concrete Road. Five men level, screed and finish 500 sq. yds. a day. Long-handled float, then belt and finally roughing brush follow. 4 ills. 700 words. The Contractor, November 9. 10 cts.

Method of Concrete Road Construction in Wood County, West Virginia. From a paper by Burdette Woodyard, County Engineer. 1,500 words. Good Roads, Nov. 17. 10 cts.

The Cracking and Buckling of Cement Concrete Pavements. Data concerning 3 concrete roads in Long Island. By H. T. Tuthill, County Assistant Engineer. 4 ills. 1,000 words. Good Roads, November 17. 10 cts.

Cold Weather Construction of Concrete Roads. Effect of temperature on the strength of concrete. By D. A. Abrams. 1,500 words. Concrete Highway Magazine, November. 10 cts.

Reinforced Concrete Roads in Sheffield. Method of construction and performance of roads built some time ago. By W. J. Hadfield, City Surveyor. 2 ills. 1,100 words. The Surveyor, October 19. 40 cts.

Rope-Pulled Roller Finishes Concrete Road. 2 ills. 500 words. The Contractor, November 23. 10 cts.

Concrete Roads in Wood County, West Va. Paper by Burdette Woodyard, County Engineer. 4,000 words. Better Roads & Streets, November. 15 cts.

Construction:

Road Drag Used in Gravel Road Construction. Description of drag used successfully in Wisconsin. By J. C. Worrell. 1 ill. 500 words. Engineering & Contracting, November 7. 10 cts.

Building Roads in the Everglades. Conditions and difficulties encountered in locating old section line corners and in constructing the road. Local clay materials were used for surfacing. By Selden L. Stewart. 3 ills. 1,250 words. Municipal Journal, November 29. 10 cts.

Making Cuts in Pavements. Pneumatic tools used in San Francisco. 1 ill. 400 words. Municipal Journal, November 1. 10 cts.

Interurban Line Hauls Materials for Concrete Roads. Delivers and spots concrete materials. 1 ill. 500 words. The Contractor, November 23. 10 cts.

Sequence of Machine Operations in Trenching Asphalt Pavements. 2 ills. 400 words. The Contractor, November 9. 10 cts.

Reconstruction of the Eaton Model Highway. Change in traffic conditions in 8 years necessitates substitution of hot-mix bituminous concrete for water-bound macadam. Motors now average 70 per cent of traffic on the roads instead of 10 per cent. as in 1909. 8 ills. 2,750 words. Canadian Engineer, November 29. 15 cts.

Convicts:

Convict Labor on Road Construction in Massachusetts. 1,500 words. Engineering & Contracting, November 7. 10 cts.

Costs on Road Work by Prison Labor in Kanawha County, West Virginia. Average number of prisoners employed, cost of food and total cost of camp. By A. D. Williams, State Highway Engineer. 3 ills. 1,000 words. Good Roads, Nov. 24. 10 cts.

Prison Labor is Efficient. West Virginia Highway Commission given an example of the work done in Kanawha County. 3 ills. 1,100 words. Southern Good Roads, November. 10 cts.

Costs:

Comparative Costs of Oregon Pavements. Cost of bitulithic redress and asphaltic concrete redress, of laying bitulithic and asphaltic concrete on a crushed rock base, of laying bitulithic and asphaltic concrete on a 5-inch concrete base and of constructing concrete pavements. 1,500 words. Engineering & Contracting, November 7. 10 cts.

Design:

Street and Boulevard Planning. By L. McLaren Hunter. 9 ills. 1,250 words. Cement Era, November. 20 cts.

Considerations Governing the Choice of the Various Types of Road Construction. From a paper by L. V. Edwards. 3,000 words. Good Roads, November 3. 10 cts.

Considerations Governing the Choice of the Various Types of Road Construction. 1,500 words. Engineering & Contracting, November 7. 10 cts.

Drainage:

Frost Breaks in Macadam Roads Due to Inadequate Drainage. By Frank P. Arnold. 2 ills. 1,000 words. Engineering News-Record, November 15. 15 cts.

Some Drainage Problems Encountered on Maine Highways. By H. Walter Leavitt. 6 ills. 1,000 words. Good Roads, November 10. 10 cts.

Finance:

Serial Bonds for Road Building. Letter from R. A. McCulloch. 1,000 words. Engineering News-Record, November 29. 15 cts.

General:

War's Influence on British Roadwork Discussed in Report. British Road Board states that heavy motor traffic has damaged highways and that maintenance has been deferred. Much reconstruction promised for after the war. 2,500 words. Engineering News-Record, November 8. 15 cts.

Tests of Concrete Road Aggregate. Abstract of paper by J. P. Nash before American Society for Testing Materials. 2,700 words. Canadian Engineer, November 22. 15 cts.

How Road Material Embargo Will Affect Construction. Opinions of various state highway officials. 1,800 words. Engineering News-Record, November 15. 15 cts.

Condition of Roads in English City Discussed by Engineer. Work in Sheffield described. Maintenance is chief work. Tar spraying is recommended. 1,500 words. Engineering News-Record, November 29. 15 cts.

Opening of Toronto-Hamilton Highway. Origin, history and development of work. 2,300 words. Canadian Engineer, November 29. 15 cts.

Hard Pavements are Replacing Dusty Adobe Roads in Western Texas. Bituminous type favored; gravel used on secondary roads and concrete laid under 5-year guarantee. 2 ills. 2,200 words. Engineering News-Record, November 15. 15 cts.

Street Work in Springfield. Review of the work accomplished in the past four years. 1,500 words. Good Roads, November 10. 10 cts.

Extent of Rural Roads. Figures from U. S. Office of Public Roads. 700 words. Municipal Journal, November 1. 10 cts.

Are Small Contracts Desirable Now? What state highway officials think of the matter. 1,500 words. Better Roads & Streets, November. 15 cts.

The Highway and Its Relations to Transportation. From an address by S. M. Williams. 1,000 words. Good Roads, November 10. 10 cts.

Hauling:

Hauling Road Gravel by Teams and Tractors. Some cost figures from experiences in Minnesota. 600 words. Municipal Journal, November 1. 10 cts.

Joints:

Concealed Joints in Georgia Roads Practice in Fulton County, Ga. By W. T. Wilson, County Highway Engineer. 2 ills. 1,100 words. Concrete Highway Magazine, November. 10 cts.

Machinery:

Effective Use of Road Machinery on

Gravel Roads. Experience in McHenry County, Illinois. 1,000 words. American City. November. 50 cts.

Maintenance:

Maintenance and Repair of Improved Roads. Brick pavements, bituminous surfaced concrete and bituminous macadam. Patrol system of maintenance. Lessons from Ohio Experimental Road. By C. C. Brown. 1 ill. 3,000 words. Municipal Journal, November 15. 10 cts.

Road Maintenance is Receiving Attention in Wisconsin. 1,000 words. Engineering News-Record. November 8. 15 cts.

Methods of Renewing Surface of Old Macadam Roads. 1,000 words. Engineering & Contracting, November 7. 10 cts.

Concrete Road Repairs in Wayne Co., Michigan. Method used in repairing concrete roads. 750 words. Good Roads, November 24. 10 cts.

Resurfacing:

Resurfacing Roadways with Tar-Macadam, Cold Mix. Results in Ohio. By J. S. Crandell. 3 ills. 800 words. Municipal Engineering, November. 25 cts.

Conserving the City's and County's Assets by Utilizing Old Pavements as Foundations for New Surfaces. Discusses repair of old macadam roads and resurfacing them with a bituminous top. 6 ills. 1,000 words. Municipal Engineering, November. 25 cts.

Resurfacing Defective Road Sections. Methods of the Illinois state highway officials. By B. H. Piepmeier. 2 ills. 1,000 words. Concrete, November. 20 cts.

Sand-Hay-Tar:

Experiment of Wisconsin Highway Commission in Improvement of Sand Roads by Hay and Tar Mats. By H. J. Kuelling, Assistant to State Highway Engineer. 3 ills. 1,500 words. Engineering & Contracting, November 7. 10 cts.

Experiment on Sand Roads by the Wisconsin Highway Commission. By H. J. Kuelling. 3 ills. 1,700 words. Good Roads, November 3. 10 cents.

Sand-Hay-Tar Experimental Road. By John S. Crandell. 3 ills. 1,000 words. Canadian Engineer, November 15. 15 cts.

Slag:

An Experimental Slag Macadam Road in Greenup County, Kentucky. Description of method of construction and result of 8 months' wear. By C. S. Bennett. 2 ills. 1,000 words. Good Roads, November 10. 10 cts.

State:

The Work of the Massachusetts State Highway Commission During 1916. 1,500 words. Engineering & Contracting, November 7. 10 cts.

As a Contractor Sees New York State's Road Situation. State Highway Commission's methods should be changed to meet new and unforeseen conditions. By D. W. Robbins, 1,500 words. Engineering News-Record, November 29. 15 cts.

Hard-Surface Pavements for State Highways. In selecting road types engineer must recognize the demand for all-year service and for heavy motor truck traffic. By C. J. Bennett, State Highway Engineer, Connecticut. 1 ill. 2,500 words. Engineering News-Record, November 22. 15 cts.

Florida's Improved Roads. By Wm. F. Cocke, State Highway Commissioner. 1 ill. 1,000 words. Southern Good Roads, November. 10 cts.

Surveys:

Speedy Road Condition Survey by Auto at $1.20 a mile. Wisconsin Highway Commission collects date on 7,500 miles of road as basis for new trunk route system. 2,500 words. Engineering News-Record, November 15. 15 cts.

The Wisconsin Survey of Road Conditions. Methods used and results obtained. 1 ill. 2,000 words. Good Roads, November 17. 10 cts.

Methods Employed by the Wisconsin Highway Commission in Making Condition Survey of State Trunk Highways. By A. R. Hirst, State Highway Engineer. 1 ill. 2,000 words. Engineering & Contracting, November 7. 10 cts.

Tracks, Railway:

Methods and Materials for Paving Between Street Railway Tracks. The fifth in a series of articles. This one describes the practice in New Orleans. By M. V. Haulard. 2 ills. 1,500 words. American City, November. 50 cts.

Concrete Paving Between Car Tracks. Practice in Metamora, Ohio. By A. Swartz. 1 ill. 600 words. Concrete Highway Magazine, November. 10 cts.

SEWERAGE, DRAINAGE AND SANITATION.

Activated Sludge:

The Treatment of Packing-House Wastes by Activated Sludge Process. Abstract of paper by Langdon Pearse. Testing station described; summary of activated sludge results; arrangement of tanks; stability of effluent; air distribution; baffling and agitation; sludge settlement and treatment; analyses; screening; recoveries; developments. 4,000 words. Engineering & Contracting, November 14. 10 cts.

Conclusions on Activated Sludge Process at Milwaukee. T. Chalkley Hatton discusses many features of sewage treatment work. He believes with a large plant that sludge can be disposed of at a profit. 5,000 words. Engineering News-Record, November 1. 15 cts.

Handling Sludge from Activated Plants. Conclusion from operation of test plants at Chicago and Ft. Worth. Settling, coagulating and pressing. Possible developments. 1,000 words. Municipal Journal, November 22. 10 cts.

Activated Sludge Tests Made by California Cities. Process competes with Imhoff tank and sprinkling filters to produce effluent for use on joint sewage farm. 4 ills. 1,800 words. Engineering News-Record, November 29. 15 cents.

Construction:

Contractor's Methods on Large Sewer Construction. Timber system in tunnel permits casting of the concrete in an entire wall section, including the arch. Materials handled by gravity. 7 ills. 2,500 words. Cement Era, November. 20 cts.

Laying Iron Pipe Sewer in White Plains. Twenty-four inch cast iron pipe used because of ground water. Trench, 8 to 18 feet deep, dug with an excavator, no sheeting being used. Tunneling under railroad. By C. P. Abbott, Deputy Commissioner of Public Works. 3 ills. 2,000 words. Municipal Journal, November 15. 10 cts.

Drainage:

Drainage in the Red River Valley in Manitoba. From a paper by G. B. McColl. 4 ills. 2,000 words. Canadian Engineer, November 8. 15 cts.

Reclamation of Alkaline Lands. Abstract from recently issued bulletin of U. S. Office of Public Roads, by R. A. Hart, Senior Drainage Engineer. 1,000 words. Engineering Contracting, November 14. 10 cts.

Manholes:

Drop Manholes for Sewers. From a paper before the Municipal Engineers of New York by I. W. Whittemore. 2 ills. 1,200 words. Canadian Engineer, November 1. 15 cts.

Operation:

Making Sure of Proper Operating Methods at York, Pa., Sewage Treatment Plant. Description of plant; operations. 3 ills. 3,000 words. Municipal Engineering, November. 25 cts.

State Control Over the Operation of Sewage Treatment Works. Reports of Committee of American Public Health Association given in abstract. 1,500 words. Engineering & Contracting, November 14. 10 cts.

Run-Off:

Run-Off Records for Two Sewerage Areas Show Contrasts. Heavy rainfall of Seattle followed by running time of 20 minutes in one area and 160 minutes in another. By H. D. Silliman. 3 ills. 1,000 words. Engineering News-Record, November 15. 15 cts.

Sanitation:

Auto-Eductor is Used to Clean Chicago Catch Basins. Are found to be much quicker and cheaper thar hand labor. Motor trucks can be converted into ordinary trucks for other work. 1 ill. 1,200 words. Engineering News-Record, November 29. 15 cts.

The Effect of the War on Municipal Engineering and Public Health. From a paper by H. Percy Bulnois. 3,500 words. The Surveyor, October 26. 40 cts.

Testing Stations:

Sewage Testing Stations. Suggestions for the construction and operation of such stations. Building tanks and other apparatus and selecting machinery. Cost of stations. Abstract of paper by Langdon Pearse. 3 ills. 2,500 words. Municipal Journal, November 1. 10 cts.

New Haven Tests Five Processes of Sewage Treatment. Activated sludge, Imhoff tank, Miles acid tank, screening and chlorination studied at experiment station. 1,250 words. Engineering News-Record, November 1. 15 cts.

Sewage Experiment Station of New Haven, Conn. Description of the plants in use for testing five methods of treatment. 2 ills. 1,200 words. Engineering & Contracting, November 14. 10 cts.

Treatment:

Screens, Filters and Humus Tanks for Indianapolis. Imhoff tanks and sprinkling filters and activated sludge process eliminated. Non-putrescible effluent for river will cost $3,000,000. 2,500 words. Engineering News-Record, November 22. 15 cts.

Disinfection of Sewage by Copper Salts. Results of experimental plant now in operation in New Haven, Conn. 1 ill. 2,500 words. Engineering & Contracting, November 14. 10 cts.

Sewerage System for a Small Town. Screen, septic tank, coke filter, settling tank, and chlorine treatment. Pumping station was necessary to serve a low district. Trench excavation by machinery. Mixing and distributing concrete. 5 ills. 1,500 words. Municipal Journal, November 29. 10 cts.

Standard Plans for Army Camp Sewage Disposal. Single-story septic tanks, trickling filters, intermittent sand filters and chlorination employed as local conditions demand. 1 ill. 1,000 words. Engineering News-Record, November 15. 15 cts.

Sewage and Its Precipitation. Results of further experiments are described. By Reginald Brown. 2 ills. 5,000 words. The Surveyor, October 26. 40 cts.

WATER SUPPLY.

Construction:

Cableway Handles Relining of Cleveland Water Basin. Filtered water reservoir reinforced with 18,000 yards of concrete, placed without erecting construction plant on roof. 4 ills. 1,800 words. Engineering News-Record, November 22. 15 cts.

Filtration:

Filtration Plant at Aylmer, Quebec. Crushed marble mixed with silica sand used as filtering medium in gravity type of mechanical plant. From a paper by H. L. Seymour. 8 ills. 3,800 words. Canadian Engineer, November 1. 15 cts.

Flow:

Intake and Outflow Velocities. Effect of mouthpieces or of flaring ends on pipes and conduits in reducing loss of head. Application to turbines and pumps. From bulletin of Illinois Experiment Station. 1,250 words. Municipal Journal, November 1. 10 cts.

Intake and Outflow Velocities. Abstract of bulletin of University of Illinois. 1,400 words. Canadian Engineer, November 15. 15 cts.

Flow Conditions in Flumes. Observations show that where water flows at a high velocity investigations should be made before final designs are adopted. By John S. Longwell. 2 ills. 1,200 words. Canadian Engineer, November 15. 15 cts.

General:

Procedure in Maintenance and Operation of McPherson, Kansas, Water and Electric Plant. By Arthur Groesbeck, Superintendent. 4 ills. 1,800 words. Municipal Engineering, November. 25 cts.

Solving the Water Supply and Sewerage Problems at the Camp Pike Cantonment. By E. B. Black, of Black & Veatch. 6 ills. 1,200 words. Municipal Engineering, November. 25 cts.

New Features in the Charter of a Water Board. From a paper by Scotland G. Highland. 1,800 words. Canadian Engineer, November 1. 15 cts.

A Sanitary Interpretation of Water Analysis. By E. C. Richardson. 2,700 words. Canadian Engineer, November 8. 15 cts.

Fallacies in Investigation of Water Supply. By A. H. Whittaker. 1,000 words. Canadian Engineer, November 29. 15 cts.

Joints:

Cement Joints for Cast Iron Water Mains. Discussion of subject before American Society of Civil Engineers. 1,900 words. Canadian Engineer, November 1. 15 cts.

Pipes and Mains:

Tests Show Tightness of Flexible Joint Pipe Across New York Harbor. 500 words. Engineering News-Record, November 15. 15 cts.

Flexible Joint Pre-Cast Concrete Pipe Laid Below Water in Lake Erie. At Lakewood, Ohio, flexible joints are iron castings and sections comprise five con-

crete pipes. At Cleveland, single pipe with concrete ball and socket joints were used. 7 ills. 1,800 words. Engineering News-Record, November 8. 15 cts.

Using Permanent Concrete Covering to Prolong the Life of Steel Pipe. Method of covering California pipe line. Cost. 1 ill. 800 words. Municipal Engineering, November. 25 cts.

Creosoted Wood Stave Pipe. Interesting features of the creosoting of wood stave pipe. From a paper by O. P. M. Goss. 1,100 words. Engineering & Contracting, November 14. 10 cts.

Modern Practice in Wood Stave Pipe Design and Suggestions for Standard Specifications. Discussion of paper by J. F. Partridge before A. S. C. E. 2 ills. 3,300 words. Canadian Engineer, November 15. 15 cts.

Breaks in Water Mains. From a paper by S. E. Killam. 1,000 words. Canadian Engineer, November 15. 15 cts.

Pumps:

Testing Chicago's New Centrifugal Pumps. Two 30,000,000-gallon steam turbine, reduction gear centrifugal pumps equipped throughout with hydraulic-driven auxiliaries. 7 ills. 4,000 words. Power, November 6. 5 cts.

Single Stage Pumping Unit Operates at High Efficiency Under Unusual Variations of Head and Capacity. 1 ill. 800 words. Canadian Engineer, November 29. 15 cts.

Reservoirs:

Steel Water Tank Encased in Ornamental Concrete Shell. Method of constructing concrete lining for Cincinnati tanks. 2 ills. 1,000 words. Engineering & Contracting, November 14. 10 cts.

Concrete Water Tank and Tower. Recent construction at New Trier, Minn. 100 words. Municipal Journal, November 22. 10 cts.

St. Paul Concrete Reservoir Has Unique Side-Wall Design. Hollow gravity wall section similar to that used in a dam. Specifications control construction features. Twisted steel reinforcement barred. By W. M. Jones, Engineer of design and construction. 2 ills. 2,200 words. Engineering News-Record, November 15. 15 cts.

Casing a Steel Frame Tower with Concrete. 3 ills. 600 words. The Contractor, November 9. 10 cts.

Mammoth Reservoir Built by Efficient Methods. Construction of reinforced reservoir in the Highland Park, Mich. Steel forms were used. 9 ills. 2,200 words. Cement Era, November. 20 cts.

Treatment:

Removal of Manganese from Water Supply. Abstract of thesis by H. P. Corson. 1 ill. 2,600 words. Canadian Engineer, Nov. 22. 15 cts.

Ultra-Violet Rays Finish Treatment of Henderson Water Supply. Sedimentation, mechanical filter and ultra-violet purification plant has been in service several months in a Kentucky town. New form of sterilizer used. Typical bacterial results. By A. P. Smith. 5 ills. 1,500 words. Engineering News-Record, November 29. 15 cts.

Interesting Municipal Installation of Ultra-Violet Ray Sterilizer. 3 ills. 1,100 words. Canadian Engineer, November 29. 15 cts.

Removal of Manganese from Water Supplies. Abstract of paper by H. P. Corson, Illinois Water Survey. 1 ill., 5,000 words. Engineering & Contracting, November 14. 10 cts.

Trenching:

Trenching at Low Cost. 100 words. Municipal Journal, November 1. 10 cts.

Using the Air Compressor on Trench Work in New York City. By C. L. Edholm. 5 ills. 1,000 words. Municipal Engineering, November. 25 cts.

Valuation:

A Discussion of the Fundamental Principles of Water Works Valuation. From a paper by J. W. Ledoux before Engineers' Club of Philadelphia. 1 ill. 5,500 words. Engineering & Contracting, November 14. 10 cts.

Water Supply:

Group of Small Towns Get Together on the Water Problem. Municipalities on the North Shore of San Francisco Bay have engaged an engineer to lay out the development. 1,000 words. Engineering News-Record, November 8. 15 cts.

A Metropolitan Water and Sewerage Project for Six Canadian Municipalities. By Charles Lenly Barker. 1 ill. 3,000 words. American City, November. 50 cts.

Water Conditions in Los Angeles. Detailed description of water system by National Board of Fire Underwriters. 1 ill. 2,500 words. Fire & Water Engineering. November 14. 10 cts.

Wells:

Unsanding Two Deep Wells. Special expedients necessary to remedy faults that were introduced by drilling without engineering supervision. By W. C. Hammatt. 2 ills. 2,000 words. Engineering News-Record, November 1. 15 cts.

STREET LIGHTING AND POWER.

Chimneys:

Controlling Smoking Chimneys. Tells of the efforts of a large power plant to assist in the prevention of smoke. A record is kept of the smoke from the chimneys and the fireman is signaled when his furnace is making black smoke. 4 ills. 1,200 words. Power, November 27. 5 cts.

Heating and Cooking:

Some Features in the Design of Domestic Electric Ranges. By J. L. Smoyer. 14 ills. 5,000 words. General Electric Review, November 20 cts.

Heating Water Electrically. Practice of cities in the Northwest in regard to kind of heater, insulation, wiring and cost. 1,500 words. Municipal Journal, November 22. 10 cts.

Lighting:

Street Lighting in Richmond, Va. Municipal plant shows great saving to city during 5 years' operation. Advantages and efficient life of incandescent lamps. 1,000 words. Municipal Journal, November 1. 10 cts.

New Park and Boulevard Lighting in Chicago. Single and 2-light ornamental units for Grant Park and Michigan Boulevard. 3 ills. 1,000 words. Electrical Review, November 10. 10 cts.

The Automobile Head-Lighting Problem Again. Treats the problem of automobile head-lighting from the point of view of all classes. By E. J. Edwards. 4 ills. 2,000 words. General Electric Review, November. 20 cts.

Rates:

Low Electric Rates in Los Angeles. By C. W. Geiger. 1,000 words. 1 ill. Municipal Journal, November 22. 10 cts.

Effect of Increased Costs on Central-Station Rates. A compilation of statistics showing how increased costs of fuel, labor and material have increased cost of serving power customers. 2 ills. 3,000 words. Electric Review, November 10. 10 cts.

Services:

Overhead and Underground Service Installations. Review of present practice in making service installations with the idea of relieving the streets as far as possible of overhead wires. By E. B. Meyer. 8 ills. 3,000 words. Electrical Review, November 3. 10 cts.

Power Plants:

Winnipeg River Water Power Plants. Description of the 3 plants. 900 words. Canadian Engineer, November 8. 15 cts.

FIRE.

Apparatus:

Motor Apparatus in Service. Lists motor fire apparatus in service in about 500 cities. 4 pages. Municipal Journal, November 29. 10 cts.

Miscellaneous:

Los Angeles, California, Fire Department. Report of National Board of Underwriters. 2,200 words. Fire & Water Engineering, November 7. 10 cts.

Horizontal Versus Vertical Exits from Buildings. 2,500 words. Fire & Water Engineering, November 7. 10 cts.

Pensions and Benefits:

Firemen's Pensions and Benefits. Data covering pension funds, proportion contributed by city and association, inspection, etc. 2 pages. Municipal Journal, November 15. 10 cts. 3½ pages. Municipal Journal, November 22. 10 cts.

Firemen's Pensions and Benefits. Information concerning these furnished by several cities. How funds are raised and systems of payment. 1,200 words. Municipal Journal, November 29. 10 cts.

Preventions:

State Fire Marshal Laws. Synopsis of Pennsylvania laws, which contains most of the provisions common to a majority of the state laws. 1,250 words. Municipal Journal, November 8. 10 cts.

The State Fire Marshals. Description of the work of their respective departments furnished by the marshals of 19 states. Powers, aims and accomplishments. 6,750 words. Municipal Journal, November 8. 10 cts.

Fire Prevention. Work done by state and national organizations. Inspection by local firemen and aid from federal department. 1,000 words. Municipal Journal, November 8. 10 cts.

The New York Bureau of Fire Prevention. Organization and jurisdiction, work performed by each of the several divisions. Supervision of structure of buildings and auxiliary fire appliances. Electrical inspection. Educational work. By Boot Adamson, Fire Commissioner of New York City. 5 ills. 4,500 words. Municipal Journal, November 8. 10 cts.

Fire Marshal Department of Ohio. The work, duties and powers of the Fire Marshal. Startling results following the declaration of war. Keeping records. By T. Alfred Fleming, State Fire Marshal, Ohio. 1 ills. 3,300 words. Municipal Journal, November 8. 10 cts.

New York Bureau of Fire Prevention. Work done by the electrical division, division of examiners, division of plan room and recording division. (Continued from November 8 issue). By Robert Adamson. 2,000 words. Municipal Journal, November 15. 10 cts.

Statistics:

Fire Department Statistics. Information concerning population and area of city, number of regular men, percentage of volunteers, salary and increases granted during the past year, also organization of fire prevention work, power to enforce ruling, and accomplishment of bureaus. 13 pages. Municipal Journal, November 8. 10 cts.

MOTOR VEHICLES.

Industry's Use of Highways and Motor Trucks to Relieve Freight Congestion. Statements from manufacturers and trucking companies concerning the use of motor trucks for hauling purposes. Many firms with war contracts use the roads for hauling raw materials and delivering the finished products. 2,400 words. Engineering News-Record, November 29. 15 cts.

Steam Motor Wagons. Operating cost. 500 words. The Surveyor, October 26. 40 cts.

Some Specific Examples of Truck Performance on Contracting Work. 900 words. Cement & Engineering News, November. 20 cts.

The Cost of Motor Trucking. 1,200 words. Cement & Engineering News, November. 20 cts.

Application of a Trailer to the Truck. Some figures of operating cost of a 5-ton truck compared with a 5-ton trailer. 2 ills. 1,600 words. Better Roads & Streets, November. 15 cts.

STREET CLEANING AND REFUSE DISPOSAL.

Street Cleaning in Cincinnati. Abstract of 1916 report. 800 words. Municipal Journal, November 1. 10 cts.

Municipal Work in Savannah. Methods and costs of cleaning the various kinds of streets. Collecting and disposing of refuse. Use and sale of materials. 1,500 words. Municipal Journal, November 29. 10 cts.

Electricity Promotes Economy in Street Refuse Disposal. New York City has modern motor-driven street cleaning and refuse hauling equipment. 3 ills. 1,500 words. Electrical Review, November 10. 10 cts.

Conserving 80,000,000 Pounds of Industrial Wastes a Year. By W. Rockwood Conover. 6 ills. 4,000 words. General Electric Review, November. 20 cts.

How Worcester is Helping to Conserve the National Food Supply. Data concerning the operation of one of the largest and oldest municipal piggeries in the United States. By Frederic Bonnet, Jr. 7 ills. 4,000 words. American City, November. 50 cts.

New Piggery in Topeka Utilizes Garbage. Steel cans are transferred from collecting wagons to motor trucks for delivery to farm. 2 ills. 1,100 words. Engineering News-Record, November 8. 15 cts.

Contract Plans and Specifications for Obtaining Refuse Incineration Works on the Most Economical Basis. Inter-relation of plant design and operation and refuse collection. Getting bids; specific guarantee. Proper tests. By Rudolph Hering. 3,000 words. Municipal Engineering, November. 25 cts.

CITY PLANNING.

City Planning in Pasadena. Progress report of city planning committee. Balloting on proposed improvements. 1,300 words. Municipal Journal, November 15. 10 cts.

(*Continued on page* 596)

NEWS OF THE SOCIETIES

Calendar of Meetings.

Dec. 26-29.—AMERICAN POLITICAL SCIENCE ASSOCIATION. Annual meeting, Philadelphia, Pa. Secretary, Clinton J. Swartz, Trenton, N. J.

Dec. 27-29.—AMERICAN SOCIOLOGICAL SOCIETY. Annual meeting, Philadelphia, Pa. Secretary, Scott E. W. Bedford University of Chicago, Chicago, Ill.

Jan. 3, 4.—NEW JERSEY STATE LEAGUE OF MUNICIPALITIES. Annual convention, Trenton, N. J. Secretary, Clinton A. Swartz, Trenton, N. J

Jan. 15-17.—VIRGINIA GOOD ROADS ASSOCIATION. Seventh annual convention, Richmond, Va. Secretary, C. B. Scott, Richmond, Va.

Feb. 6-13.—FIRST CHICAGO CEMENT MACHINERY AND BUILDING SHOW. Supersedes annual Chicago Cement Show. Held at the Coliseum, under direction of the National Exhibition Co.

March 17-24.—PAN-AMERICAN CONGRESS ON CHILD WELFARE, Montevideo, Uruguay. Secretary, Edward N. Clopper, 105 East 22d Street, New York, N. Y.

National Municipal League.

The recent annual meeting of the league was held in conjunction with the Society for Training for Public Service, the City Managers' Association and the Municipal Research conference and formed the 25th National Conference for Good Government. The sessions were held in Detroit, Nov. 21-23, with headquarters at the Hotel Statler.

At a luncheon held on Wednesday, the question "Will the City Manager Form of Government Fit All Cities—Large Cities—Machine Controlled Cities?" was discussed by Richard S. Childs, New York; Gaylord C. Cummin, Grand Rapids; George B. Harris, Cleveland; Lent D. Upson, Detroit; Ossian E. Carr, Niagara Falls; Henry M. Waite, Dayton, and George W. Knox, Niagara Falls.

In the afternoon the presidential address was delivered by Lawson Purdy, New York, the subject being "Municipal Pensions." Clinton Rogers Woodruff, Philadelphia, secretary, made his annual review on the subject, "American Cities During War Times and Their Problems." Committee reports were made by city manager Henry W. Waite, of Dayton, on "City Management as a Profession"; by Dr. Delos F. Wilcox on "Recent Developments in the Public Utilities Field," and on "State Municipal Leagues" by Homer Talbot, of the Kansas league.

In the evening a general session took up the problem "Feeding Our Cities in War Time." The speakers were George W. Perkins, chairman of the New York Market Commission, on "A State Organization for Food Supply"; Clarence S. Kates, "Agents for Better Local Distribution of Food"; Marcus M. Marks, borough president, Manhattan, New York, "Wholesale and Retail Markets," and Everett Colby, "How the Cities Can Effectively Assist in the Food Crisis."

On Thursday morning a joint session was held with the bureaus of municipal research under the chairmanship of Otto Kirchner, Detroit. The subject was "Executive or Legislative Budgets" and both sides were discussed by Governor Emerson C. Harrington, of Maryland, Dr. Frederick H. Cleveland and Dr. E. A. Fitzpatrick.

At a luncheon the members took up the possibilities of "Non-Partisan City Government." Prof. Charles E. Merriam, of Chicago, in a paper, asked whether it could be obtained and then a number discussed whether the non-partisan ballot eliminates the party machine in large cities.

A general session in the afternoon dealt with the problem of "The City and the County," Richard S. Childs being chairman. The situation in Baltimore and Denver were explained; George C. Sikes discussed "Consolidation Problems in California," and Prof. Wm. Anderson "Urban-Rural Consolidation in Europe."

"Training for Public Service" was the topic of a general session held Friday morning. Gaylord C. Cummin, city manager, Grand Rapids, discussed "Training City Managers"; "Getting Trained Men Into Public Service" was the theme of Dr. Wm. H. Allen, of the Institute for Public Service, New York; "Effects of War on Trained Public Service," Richard H. Dana, president, National Civil Service Reform League, and "Organized Labor and a Trained Public Service" were presented.

At the luncheon, "Selling Good Government to the People" formed the topic for an interesting discussion during which Dr. D. F. Garland, director of welfare, Dayton, talked on "Humanizing Welfare Reports."

"War Time Experiences of English and Canadian Cities" was discussed by Sir George Reid, Premier, New South Wales; Sir George Gibbons, and mayor Thomas L. Church, of Toronto, at a general session held in the afternoon.

City Managers' Association.

An interesting experience convention was held during the three days' sessions of the city managers at the Detroit meeting. The first day, Monday, was devoted to inspection trips and an informal dinner.

At the roll call on Tuesday morning each manager gave his length of service and business or profession before becoming manager. Of the 25 registered, 90 per cent were engineers. At the afternoon general session, H. G. Otis, of Beaufort, S. C., was chairman and Manley Osgood, Ann Arbor, Mich., described his city's experiences with paving. E. P. Goodrich, New York, had a paper read on "City Planning for Small Cities."

At a round table meeting held Wednesday morning valuable experience was shared by the managers on practical problems in administration relating to law; public utilities; officials and workmen; newspapers; commissioners; financing public improvements; special problems of small cities; governmental conditions.

An open meeting in the afternoon was presided over by city manager G. O. Nagle, of Wheeling, W. Va. Richard S. Childs asked in a paper "Now that we have the city manager plan, what are we going to do with it?" and the discussion of the question was led by city manager Henry M. Waite. W. P. Lovett of the Detroit Citizens' League spoke on "Our Citizen Bosses" and city manager H. L. Roby, of Alpena, Mich., led the discussion. A dinner in the evening was marked by an address by Prof. O. E. Merriam, of Chicago.

A business session was held Thursday morning. City manager Waite gave a splendid report on city management as a profession and divided cities into three classes, enumerating the general qualifications for manager needed in each class.

The following officers were elected for the coming year: President, Gaylord C. Cummin; vice-president, C. A. Bingham; secretary-treasurer, H. G. Otis, Beaufort, S. C.

Association of Governmental Research Agencies.

This association met Nov. 20, 21, 22 at the Detroit convention and a number of important problems involved in municipal research practice and citizen interest were covered by representatives of all the important research bureaus in the country.

"Bureau Relationships" was discussed in the phases of cooperation between bureaus, with other civic agencies and with officials by LeRoy Snyder, Rochester; Chas. A. Beard, New York; Horace L. Brittain, Toronto, and Frederick P. Gruenberg, Philadelphia.

At a dinner Tuesday evening, there was a round table discussion on "The Effects of Changing Bureau Personnel," from the viewpoint of directors, trustees and public officers, in which the following participated: D. C. Sowers, Akron; A. M. Mandel, Detroit; F. M. Harpham, Akron; H. M. Waite, Dayton; Gaylord C. Cummin, Grand Rapids; H. S. Keeler, Chicago, and Stanford T. Haynes, Springfield.

"Improvements in Budget Procedure" was the theme of the Wednesday morning session and the subjects taken up were: "Responsibility for the Financial Plan," "Appropriations for Activity," "Classifications of Estimates," "Control of Salaries" and "Budgeting of Bonds." The chairman was George Engle, comptroller of Detroit, and the discussion leaders were the following municipal researchers: Herbert Sands, New York; Lent D. Upson, Detroit; W. B. Holton, San Francisco; LeRoy E. Snyder, Rochester; Don C. Sowers,

Akron; R. E. Miles, Ohio Institute of Public Efficiency, and M. G. Lawton, Rochester.

At luncheon there was a round table discussion of municipal surveys with the following topics: "Do Surveys Produce Results?" "The Build As You-Go Survey," "Follow-Up of Surveys," "Surveys vs. Active Cooperation." Carl E. McCombs, J. H. Hutchinson, H. S. Morse, W. B. Holton, LeRoy Hodges and Bruce Cornwall led the discussion.

At the afternoon session "Improvements in Municipal Accounting Procedure" were taken up and cost accounting, central purchasing and stores accounting and payroll accounting were investigated.

The final Wednesday session dealt with "The Relationship of Bureaus and Universities" and a number of prominent university educators and research bureau men took part in it.

The convention ended with an informal conference Thursday evening on the subjects of street cleaning, sewers, education and police.

American Road Builders' Association. The fifteenth annual convention of this association will be held some time during the early part of February in St. Louis. Exact date and location of headquarters will be selected later.

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

In constructing SEWERS, Des Peres, Wis., has the engineering services of the firm of Orbert & Albert.

A SEWER SYSTEM and DISPOSAL PLANT are to be built by West Middlesex, Pa. The engineer is Louis D. Tracy.

Armagh, Que., is constructing a WATER POWER PLANT. The engineers for the work are Couvin & Beauchemin.

STREET IMPROVEMENTS are to be made by Lindsborg, Kans., plans and specifications for the work being in course of preparation by the engineering firm of Riddle & Riddle.

Rochester, Minn., is to construct a BRIDGE to cost about $40,000. The consulting engineer, J. H. A. Brahtz, has been selected to prepare plans and specifications.

Anderson, Ind., is to make extensive SEWER IMPROVEMENTS to cost about $450,000. The city has retained G. L. Clausen to prepare plans and specifications for the work.

SEWERAGE and WATERWORKS SYSTEMS are to be built by Campbellsport, Wis., which has retained Jerry Donahue as consulting engineer to prepare plans.

A large RESERVOIR, to cost about $200,000, is to be built by Vallejo, Cal. Plans and specifications for the improvement have been completed by the engineer, F. H. Tibbetts.

A FILTRATION PLANT and DAM are to be built by Coxsackie, N. Y. The village has retained Morrell Vroomen as engineer to prepare plans and specifications.

The city of Seattle, Wash., is engaged in a case against the local lighting company before the state public service commission involving the GAS RATES. The city has retained as its expert to investigate and testify, Edward W. Bemis.

In making repairs to a BRIDGE, Johnstown, Pa., has the services of the Farris Engineering Company.

A SEWAGE DISPOSAL SYSTEM is to be built by Rutledge, Pa. The engineer is C. E. Collins.

A FILTRATION PLANT is to be built by the borough of Mt. Joy, Pa. Plans have been completed by the engineers, Gannett, Seelye & Fleming.

Kenilworth and Winnetka, Ill., are making PAVING IMPROVEMENTS. Plans for the work were prepared by the engineers, Windes & Marsh.

Pulaski county, Little Rock, Ark., is to build a reinforced concrete BRIDGE to cost about $800,000. The county commissioners have retained Daniel B. Luten to design the structure.

Jersey City, N. J., is to build a SEWAGE DISPOSAL PLANT at Boonton. Plans for the improvement are being prepared by the engineer, Clyde Potts.

Minot, N. D., is to improve its WATERWORKS by extending its mains and building a 3,000,000 gallon concrete reservoir. The engineer is Frederick Bass.

Preliminary plans for PAVING IMPROVEMENTS in Cleveland, Okla., have been made by the Benham Engineering Company.

Detroit, Mich., is considering the construction of a RAPID TRANSIT SUBWAY to relieve increasing traffic congestion. The city officials are conferring on possibilities with the firm of Barclay Parsons & Knapp, which has been retained to investigate and report.

Okmulgee County, Okla., is to make extensive ROAD IMPROVEMENTS, including the grading and paving of about 118 miles and the construction of culverts. Plans and specifications for this work were prepared by the consulting engineering firm of Harrington, Howard & Ash.

PERSONALS

Tuska, Gustave R., consulting engineer, of New York City, formerly chief engineer of the Panama Railroad company, and lecturer in engineering at Columbia University, has been commissioned Major in the engineer section of the Officers' Reserve Corps of the United States Army.

Smith, William Burns, mayor of Philadelphia, Pa., from 1884 to 1887, died recently at his home in Laurel Springs, N. J.

Hommon, Charles C., formerly in charge of the Atlanta, Ga., sewage disposal plants, has recently received a commission as Captain in the Sanitary Engineers' Corps of the Army and is for the present stationed at Atlanta in connection with the operation of the sewage plants at the army camps located near the city.

Kastenhuber & Anderson, the firm of civil engineers and surveyors, Easton, Md., has closed its office for the period of the war, both members of the firm having entered army service. E. G. Kastenhuber, Jr., is first lieutenant in the Sanitary Corps and John Anderson is sergeant, Battery D, 310th Field Artillery.

Mayor-elect John Galvin, of Cincinnati, O., has announced the following appointments: John R. Holmes, director of public safety; Charles F. Hornberger, director of public service; Newbold L. Pierson, secretary to the mayor.

The following mayors were recently elected in Indiana:

Martinsville—George F. Schmidt.
Michigan City—F. C. Miller.
Mishawaka—Ralph W. Gaylor.
Mitchell—Calvin Farris.
Monticello—S. W. Thompson.
Montpelier—David Bryston.
Mt. Vernon—George F. Zimmerman.
Muncie—Rollin H. Bunch.
Newcastle—George A. Elliott.
New Albany—Robert W. Morris.
Noblesville—D. B. McCoun.
North Vernon—Albert A. Tripp.
Peru—Maurice Clifford.
Portland—C. O. Mitchell.
Plymouth—Charles F. Holtzendorff.
Princeton—E. E. Noble.
Rensselaer—Charles G. Spitler.
Richmond—Dr. W. W. Zimmerman.
Rising Sun—Scott Thompson.
Rochester—H. G. Miller.
Rockport—Edward Martin.
Rushville—Arthur B. Irvin.
Seymour—C. W. Burkhart.
Shelbyville—Lee B. Hoop.
South Bend—Dr. Franklin R. Carson.
Sullivan—Henry Smith.
Terre Haute—Charles R. Hunter.
Tipton—S. D. Rouls.
Union City—Charles J. Gunkel.
Valparaiso—P. L. Sisson.
Veedersburg—Orville V. Zimmerman.
Vincennes—James D. McDowell.
Wabash—Dr. L. W. Snith.
Warsaw—Charles A. Rigdon.
Washington—Dr. S. L. McPherson.
Winchester—George Leggett.
Whiting—W. E. Schrage.

INDUSTRIAL NEWS

Cast Iron Pipe.—Prices at all points remain the same after the recent rise. Quotations: Chicago, 4-inch, class B and heavier, $58.50; 6-inch $55.50. New York, 4-inch, class B and heavier, $59.50; 6-inch, $56.50. Birmingham, 4-inch, class B and heavier, $53; 6-inch, $50; class A, $1 extra, all sizes.

The Federal Motor Truck Company, Detroit, Mich., has just let a contract for the construction of an addition to its plant capacity which will greatly increase the present floor space in order to keep pace with its steadily expanding business. The new building will be of brick and steel construction and will be rushed in order to be in use in time to meet the present heavy requirements. With the completion of this structure, Federal facilities will have increased about one hundred per cent during the past year. This added manufacturing capacity will, however, suffice to meet the immediate demands only. It will be necessary to further extend the present plant in order to care for the constantly growing business of the company. To this end plans for other new buildings are now in course of preparation. In its eight years of corporate existence, the company has experienced a steady, consistent growth. The company's capitalization has increased from $50,000 to $2,000,000.

The Goodyear Tire & Rubber Company, Akron, O., announces that the past year's business was the most successful in volume and profits, of any year in the company's history. Gross sales jumped from $63,000,000 to $111,000,000 and net profits from $7,003,330.09 to $14,044,206.10—an increase of 74 per cent in volume and 100 per cent in profits. And of this volume less than one per cent was contributed by direct war business. President F. A. Seiberling, in his report to stockholders, stated that plant extensions under constructions a year ago had been completed, nearly doubling its productive capacity, and providing facilities for several years to come. "To provide for these extensions," he said, "the directors during the year increased the fixed capital of the company by the sale of $7,500,000 preferred stock and $3,372,000 common stock. The company's good will, growing out of satisfactory trade relations with over 70,000 customers and more than a million users of its product, is steadily increasing in value and constitutes its most valuable asset, though not listed in our balance sheet. And the patents, trade-marks, designs, etc., although worth millions of dollars to us, are listed on our statement at but $1.00. We have earned the past year, subject to deductions for federal tax, 61½ per cent for the common stock of this company—the highest record we have ever made." All of the directors were reelected, as follows: F. A. Seiberling, C. W. Seiberling, G. M. Stadelman, F. H. Adams, P. W. Litchfield, H. B. Manton and J. B. Loomis. The directors in turn elected the following officers: F. A. Seiberling, president and general manager; C. W. Seiberling, vice president and manager of purchases; G. M. Stadelman, vice president and manager of sales; P. W. Litchfield, vice president and factory manager; A. F. Osterloh, secretary; W. E. Palmer, treasurer and assistant secretary; H. J. Blackburn, second assistant treasurer.

MUNICIPAL INDEX

(Continued from page 593)

Town Planning After the War in Dundee, Scotland. Laying out the districts; type, design and cost of houses. 4 ills. 3,000 words. American City, November, 50 cts.

A Billboard Ordinance of Unusual Significance. By Seward C. Simons, Secretary, Los Angeles Municipal League. 2 ills. 2,000 words. American City, November. 50 cts.

Some Aspects of the Housing Problem. By J. Holroyde. 3,000 words. The Surveyor, October 19. 40 cts.

Construction of Industrial Villages for Workmen. Description of two recent projects carried out by Goodyear Cotton Mills Co. and the Youngstown Sheet & Tube Co. 1 ill. 2,200 words. Engineering & Contracting, November 28. 10 cts.

BRIDGES AND DAMS.

Pennsylvania Specifications for Culverts and Short Span Concrete Bridges. 1,200 words. Municipal Engineering, November. 25 cts.

Twenty-Four Designs for Salem Bridge Wasted Before Commissioners Agreed. 5 ills. 2,200 words. Engineering News-Record, November 8. 15 cts.

General Specifications for Steel Highway Bridges, Ontario, 1917. An analysis of the 1917 specifications shows many changes and improvements. Recommended length of beam span has been extended from 35 to 40 feet. By E. H. Darling. 3 ills. 2,600 words. Canadian Engineer, November 8. 15 cts.

The Greatest Arch Bridge in the World and Its Cost. Figures concerning the Hell Gate arch. 1,200 words. Engineering & Contracting, November 28. 10 cts.

Design of Piedmont Park Bridge, Atlanta. Architectural treatment of structure spanning railway tracks in attractive residential section. By Albert M. Wolf. 7 ills. 2,500 words. Concrete, November. 20 cts.

Permanent Versus Temporary Bridges. By Daniel B. Luten. 1 ill. 1,500 words. Cement & Engineering News, November. 20 cts.

Rainbow Arch Bridges. Two Illinois structures are exceeding artistic in appearance. This design is very economical where head room is not suffcient for the ordinary type of dirt-filled arch. 1 ills. 1,100 words. Cement Era, November. 20 cts.

French Engineers Span Aisne River Under Shell Fire. Small steel pontoons support the first foot bridge. Scows moored to carry heavy traffic bridge. Permanent steel structure finally completed. By Robt. A. Drake. 3 ills. 2,200 words. Engineering News-Record, November 29. 15 cts.

Separate Concreting of Ribs, Deck and Sidewalks Saves Form Lumber. Centers for 60-ft. span bridge take less than 7,000 ft. B. M. Concrete chutes erected by pulling them along cables. 6 ills. 1,000 words. The Contractor, November 23. 10 cts.

Special Forms Facilitate Concreting of Viaduct Deck Slab. 1 ill. 800 words. Engineering News-Record, November 29. 15 cts.

The Chouteau Avenue Viaduct. Inclined approaches along viaduct from bottom of valley spanned. Vehicle subway under one side of the floor. Provision for expansion. Delivering concrete from a central plant. By W. E. Hardenburg. 4 ills. 1,600 words. Municipal Journal, November 1. 10 cts.

Dam of Home-Made Design Failed in Nova Scotia. Unable to pass flood waters, dam failed from wash-out at end. By K. H. Smith. 4 ills. 1,000 words. Canadian Engineer, November 22. 15 cts.

STRUCTURES AND MATERIALS.

Field Tests Made on Oil Treatment of Wood Against Marine Borers. By C. H. Teesdale, and L. F. Shackell. 6 ills. 3,500 words. Engineering News-Record, November 15. 15 cts.

Diagram for Use in Designing Timber Columns. By W. S. Wolfe. 1 ill. 1,200 words. Engineering & Contracting, November 28. 10 cts.

Density Factor Safe Guide to Strength of Structural Timber. Result of investigations made recently. 1,100 words. Engineering & Contracting, November 28. 10 cts.

Tests on Nailed Joints in Fir and Hemlock Timbers. Building Bureau of Portland, Ore., establishes safe loads for woods commonly used on Pacific Coast. 3 ills. 1,200 words. Engineering News-Record, November 8. 15 cts.

Concrete Pipe Under Hydrostatic Pressure. Discussion by the Editor. 1 ill. 2,000 words. Concrete, November. 20 cts.

Making Concrete Pipe Specials. Methods of making Y's, T's, bends and other fittings. 2 ills. 2,500 words. Concrete, November. 20 cts.

Method of Waterproofing Concrete Sewers. Competent inspection and proper materials necessary. By Duncan Cameron. 700 words. Cement Era, November. 20 cts.

Simple Precautions Make Cold Weather Concreting Safe. 1,000 words. The Contractor, November 9. 10 cts.

Practical Methods of Handling and Measuring Bulk Cement. 1,100 words. Concrete, November. 20 cts.

Cement Saved by Using Screened and Remixed Gravel Instead of Pit Run Gravel. By J. P. Nash. 2 ills. 1,000 words. Engineering & Contracting, November 7. 10 cts.

MISCELLANEOUS.

Improving Municipal Reports. Suggestions by officials of Columbus, O. Prompt completion, condensation and uniformity in rendering make reports valuable. 1,500 words. Municipal Journal, November 22. 10 cts.

The "Cost Plus" Form of Contract Used on Cantonment Work, Including a Schedule of Equipment Rental Rates. 6,000 words. Engineering & Contracting, November 28. 10 cts.

"Cost Plus" Contract Forms of Stone & Webster. 1,800 words. Engineering & Contracting, November 28. 10 cts.

Lump Sum Versus "Cost Plus" Contracts. From a paper by F. A. Jones. 2,500 words. Engineering & Contracting, November 28. 10 cts.

The Housing and Feeding of Construction Forces. Dining room and kitchen. Kitchen utensils, dishes and other equipment needed. Laying out of buildings, forms for reports, water supply, garbage, lighting and care-taking. 5 ills. 6,000 words. Engineering & Contracting, November 21. 10 cts.

Lining an Irrigation Canal by Gunite Method. 6 ills. 900 words. Canadian Engineer, November 8. 15 cts.

Regulations of the State of Washington Regarding Construction Camps. 1,100 words. Engineering & Contracting, November 21. 10 cts.

Methods and Costs of Tree Planting. Abstract of bulletin of U. S. Dept. of Agriculture. 3,000 words. Engineering & Contracting, November 21. 10 cts.

Detention Reservoir With Spillway Outlets as an Agency in Floom Control. Abstract of paper before A. S. C. E. By H. M. Chittenden. 1 ill. 2,200 words. Canadian Engineer, November 1. 15 cts.

Calculations for Design of Irrigation Structures. From an article by C. W. Helmick. 3 ills. 1,000 words. Canadian Engineer, November 15. 15 cts.

One Solution of the Fuel Problem. Lessons from the work of the emergency purchasing committee of Kalamazoo in supplying winter fuel to citizens at reasonable rates. By J. B. Balch, Mayor. 3,000 words. American City, November. 50 cts.

Public Utility Rates. An article that should be read by every municipal officer, central station manager and public utility commission member. By H. S. Cooper. 7,000 words. General Electric Review, November. 20 cts.

Novel Gas Highway Beacons. Are installed at dangerous curves to warn motorists of danger. 2 ills. 1,000 words. Better Roads & Streets, November. 15 cts.

Municipal Journal

Volume XLIII. NEW YORK, DECEMBER 22, 1917 No. 25

HIGH PRESSURE FIRE SYSTEM OF CINCINNATI

For Protection of Five Hundred and Seventy Acres of High-Value District—Valves and Valve Chambers—Flush Hydrants with Portable Heads—Special Features of Mains.

By J. A. HILLER.*

During the past twenty-five years the growth of most American cities has been vertical, as well as horizontal. This upward growth has, in most cases, been confined to the business districts, varying in extent with the size of the city and the volume of business transacted. The modern skyscraper buildings, reaching twelve to thirty stories in height, have entirely changed the fire-fighting conditions and rendered the old methods entirely inadequate. Where buildings are low and scattered, the use of portable fire engines has proven satisfactory, but where large areas are covered with high buildings, enough engines cannot be concentrated within reasonable distance to properly control and extinguish fires in such locations. These conditions have resulted in the installation of high pressure fire systems, consisting generally of separate mains and pumping machinery which are independent of the city water supply; although in other cases the mains have been supplied by gravity, the topographical conditions of the cities making this possible.

The conditions in Cincinnati are similar to those in other cities, and better fire fighting facilities have been needed for some time. During the past ten years, the installation of a high pressure fire system for the congested, high-value district has been talked of, reports have been made, plans suggested and approximate estimates of cost prepared. In all the earlier reports the lead of other cities was generally followed; that is, a system of separate distributing mains, valves and hydrants, and a pumping station for obtaining the desired pressure. No particular type, design, number, or capacity of pumping units was ever definitely proposed, and the question of the water supply was always deferred until such time as installation could be made.

The proposition for water supply first advocated for this system was to use the site of the old pumping station, situated on the river front about one half mile above the business district of the city. The advantage claimed for this location was that unfiltered water could be used for fire-fighting purposes. The disadvantages so outweighed this, however, that very early this plan was discarded. Among those disadvantages may be mentioned the fact that the fluctuations of the river level are about seventy feet. To place pumps in a pit sufficiently low to give them a practicable suction head during low water and to avoid flooding at times of high water would have required a structure of about eighty feet deep and the construction of an expensive intake tunnel. Owing to the difference of level between this location and the protected territory, the discharge pressures would have had to be about seventy-five pounds greater than in a station located nearer the level of the business center. Either a dry system of mains would have had to be used or continual pumpage to keep the mains filled would have been necessary. The fixed charges for interest and sinking fund on the additional cost of such a station would have been fully twenty-five times the cost of filtering the water used for the extinguishing of fires.

The next location mentioned for a high pressure pumping station was at Eighth street and Eggleston avenue. At this site there are three large mains of the city water supply, two of which are the continuation of the pump main, while the other is one of the effluent pipes of the Eden Park reservoirs. Suction could be taken from these mains at about 50 pounds pressure. Breakage in any one of the large mains would not necessarily result in an interrupted supply to the high pressure pumps. In the selection of this location and in the reports made, no fixed type, design or size of pumping units was mentioned, this question always being deferred until more study was given.

During the year 1913, the city council authorized the submission to a referendum vote of the question of a bond issue of $400,000 for the purpose of beginning the extension of the water works for the purpose of providing a high pressure fire system. No mention was made of the method proposed for obtaining this result. At the November election, this bond issue was favorably voted upon and the preparation of detailed plans for the distribution system was begun, and some contracts for pipe, specials, valves, hydrants and pipe laying were entered into and work done during the year 1914.

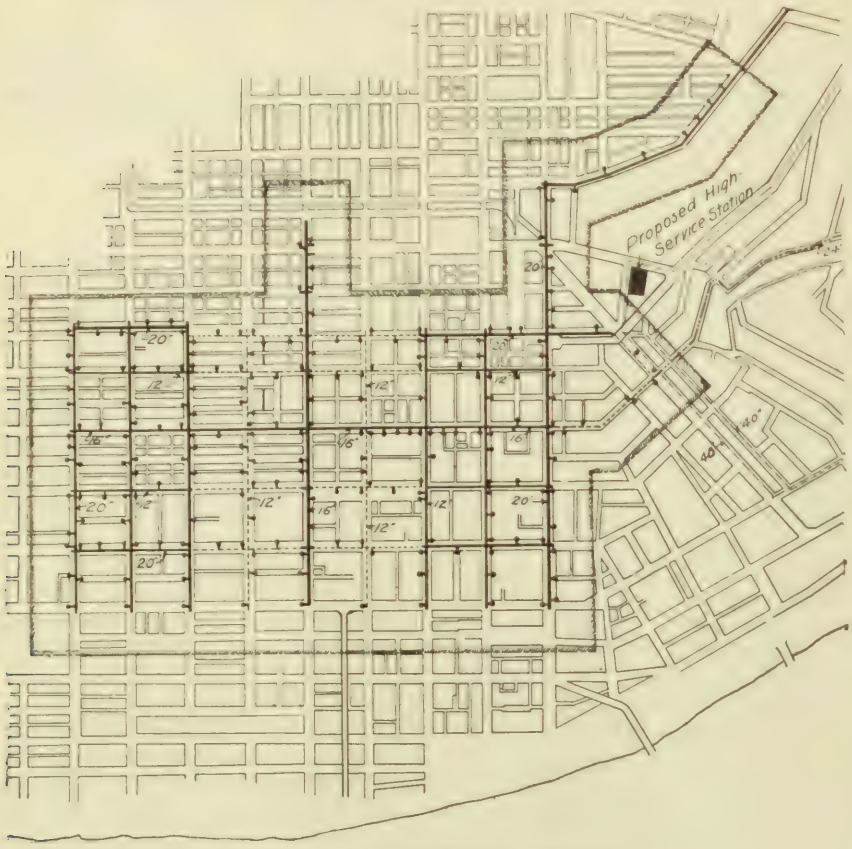
Since the amount of the first bond issue was but one-half the estimated cost of completing the system, additional authority was asked at the November election of 1915. This was unfavorably voted upon and the question was resubmitted at the April primary election in 1916, at which time the bond issue for a second $400,000 was authorized.

THE DISTRIBUTION SYSTEM.

As shown by the accompanying map, the district to be supplied extends from Central avenue on the west to Broadway on the east, and from Eighth street on the north to Third street on the south. The length east and west is about 3,600 feet and the distance north and south is about 2,250 feet. Considering that a strip 300 feet in width surrounding this area and on each side of the projecting mains can be served, the total protected area is approximately 570 acres. The size of mains is such that future extensions in all directions can be made. The district now under consideration is sur-

*General Superintendent of Water Works, Cincinnati, Ohio.

rounded by a 20-inch main, and is subdivided into four parts by two 16-inch mains laid practically through the center each way. All other mains are 12 inches in diameter. This will require 17,250 feet of 20-inch pipe, 6,250 feet of 16-inch pipe and 20,700 feet of 12-inch pipe, exclusive of 6,350 feet of 24-inch pipe to be laid from Eden Park as a second supply main.



MAP OF HIGH PRESSURE DISTRICT.

Four valves are placed at every cross intersection and three at each tee intersection, thus permitting any intersection or single block being shut off without interfering with the remainder of the system. Sixteen-inch valves are used in the 20-inch mains to avoid excessive depth of trenches and for more rapid shutting off. All valves are placed in brick chambers, permitting easy access for repairs. Cast iron curbs and covers are provided, on which are marked H. P. F. S. VALVE.

All pipe are of cast iron, with double grooves in hubs and on spigots. Special castings are of semi-steel with flanged ends. The flanged ends were made extra heavy and machined for tongue and groove joints.

The flanged joints were made up by using two one-sixteenth-inch sheets of soft lead, between which was placed a canvas gasket soaked in red lead paste. All valves have similar flanged connections. The pipe, special castings, valves and hydrants were tested to 600 pounds at the factory and all completed mains were tested to 400 pounds after laying and before the trenches were back-filled. The requirements for leakage in completed mains were as follows:

> The leakage from mains and hydrant connections for each section tested, while under a pressure of 400 pounds per square inch, shall not be greater than at the rate of one-half U. S. gallon per lineal foot of pipe joint per twenty-four hours. The length of pipe joint shall be figured on the nominal interior diameter of the pipe.

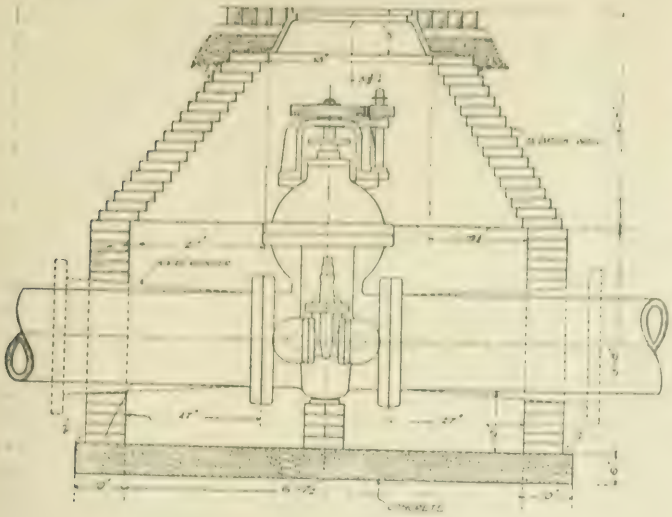
No difficulty was encountered in obtaining this degree of tightness. In all mains laid, no leakage has been found in any of the caulked joints, but some of the flanged joints showed leakage, the stopping of which required considerable work.

A great deal of difficulty was encountered in the pipe-laying to avoid existing sub-structures in the streets, and in many cases excessive depths were necessary.

All fire hydrants are of the flush type with portable heads, the same as adopted and used in the Baltimore high pressure system. (See Municipal Journal for June 13, 1912.) The branches to hydrants are eight inches in diameter, each provided with a valve so that hydrants can be repaired without shutting off any mains. Each hydrant and its control valve are placed in a single brick

MAP SHOWING HIGH PRESSURE FIRE SYSTEM, MAINS, PUMPING STATIONS AND RESERVOIRS.

chamber with a cast-iron curb and two covers, one marked H. P. F. S. VALVE, the other H. P. F. S. HYDRANT.



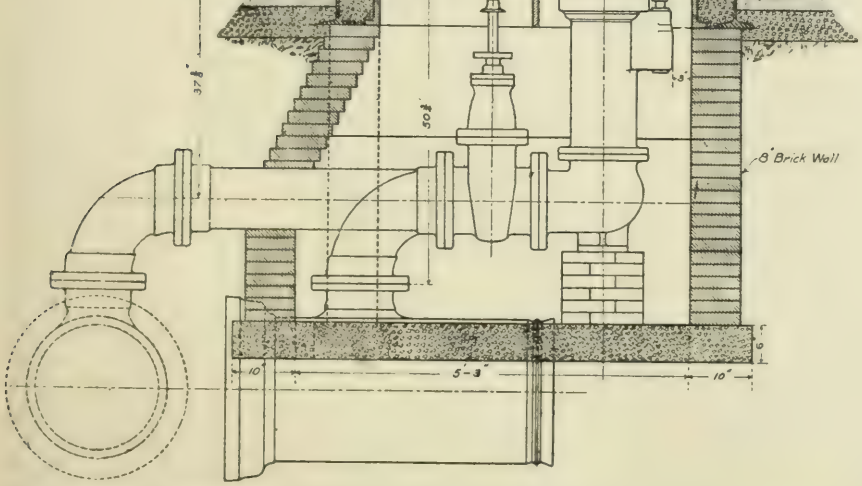
CHAMBER FOR 16-INCH VALVE.

Wherever practicable, the hydrants are placed within the car tracks. This is done for two reasons: The traction company is always the first to remove snow from the streets, therefore the hydrants will be cleared of snow as early as possible; and having the hydrants within the street limits rather than on the sidewalks, there is less danger of injury in the case of falling walls. Each portable head for the hydrant is equipped with four 2½-inch outlets provided with controlling valves which permit any pressure from a complete shut-off to the maximum available. There is a fifth 2½-inch outlet without valve, which can be used for the attachment of a turret nozzle to be used as a deluge stream or a fire curtain.

Two hydrants are placed at every street intersection and at least one between streets. Thus, within a single block twenty streams can be thrown without using more than an average of 300 feet of hose for each.

The number of hydrants placed to date is 182, which, with 56 to be installed on uncompleted mains, gives a total of 238, or an average of one hydrant for each 186 feet of main or one hydrant to each 2½ acres of protected area.

(To be continued)



FLUSH HYDRANT WITH HEAD ATTACHED, VALVE AND CONNECTIONS.
Shows alternative connections when over or at one side of main. Combined hydrant and valve chamber, with double curb for two covers.

COST OF CONCRETE PAVING IN SAVANNAH.

During 1916 the city of Savannah constructed by force account 31,503 sq. yds. of concrete pavement. All was one-course, the average thickness being 6¼ inches and the proportions 1:1½:3. Concrete was mixed in an Austin cube mixer No. 13, one minute being allowed the mixer for each batch. The consistency of the concrete was such that only shovels were used for placing. Grade pegs were set for six-foot squares. Great care was taken in the construction and every precaution used to bring about good results. Some of the pavements have been down more than a year and to date no signs of cracks have appeared.

Itemized Cost of Constructing Pavement.

Labor:		
Watchman	$0.0165	
Grading	.0048	
Handling cement	.0062	
Handling sand	.0268	
Handling crushed stone	.0376	
Spreading concrete	.0225	
Operating mixer	.0391	
Finishing surface	.0135	
Making expansion joints	.0053	
Covering pavement	.0069	
Moving equipment	.0060	
Cleaning up	.0201	
Removing trees	.0022	
Resetting curb	.0011	
Total labor		$0.2906
Teams:		
Grading	$0.0146	
Moving equipment	.0012	
Cleaning up	.0042	
Covering pavement	.0006	
Total hired teams		$0.0206
Materials:		
Cement	$0.5608	
Sand	.0565	
Crushed stone	.3922	
Expansion joints	.0088	
Coal	.0041	
Tools and hardware	.0190	
Lumber	.0029	
Use of equipment	.0216	
Total materials		$1.0658

Joints were formed by using metal plates with tarred paper between, the plates being withdrawn while the concrete was still fresh enough to fill the crevices left by their removal. The paper of the joint is left standing an inch or more above the surface. This protects the edges of the concrete slabs until they attain their full strength. The expansion joints are placed 35 feet apart and also along the curbs. A split float was used on the joints, giving them a beaded edge. The final finish was given to the surface by rolling with a galvanized metal cylinder and then floating with a one-inch rubber garden hose.

The prices of the material delivered on the work were recorded and all costs carefully kept. The cement cost was $1.63 a barrel for approximately one-third of the amount used and $1.75 a barrel for the remainder. Crushed stone cost $2.64 to $2.68 per cu. yd. and sand 70c. and 80c, two-thirds of the amount used being pur-

chased at the higher figure. Tar paper for the expansion joints cost 74c and 96c per roll, coal $3.60 per ton and lumber $20 per M. The construction gang was composed of white laborers, 20 of whom were paid $1.75 per day and the other ten $1.50. The foreman was paid $4. Nine hours constituted a working day. A mule and a cart combined cost $1.50 a day and the number used varied from 1 to 6. The total cost of the pavement was $1.377 per sq. yd., or $7.95 per cu. yd. of concrete in place. The itemized costs for labor, teams and materials were as given in the table on the previous page.

SEWAGE DISPOSAL FOR A NEW YORK AREA*

Methods of Treatment Recommended—Grit Chambers, Sedimentation Tanks and Oxidation—Separate System Advocated—Principles of Design.

Concerning treatment, it is proposed that all the sewage be passed through grit chambers before pumping (the topography seems to render necessary the pumping of a considerable part of the sewage collected), both to prevent undue wear of the pump impellers and also to prevent the clogging of sludge pipes from the sedimentation tanks. If sedimentation tanks of the Imhoff type are used, the digested sludge from these can be drawn off to sludge beds for drying and then used for filling in low land, of which there are thousands of acres in the vicinity of the probable locations of treatment plants. Should this use of sludge ever be considered undesirable, it can be drawn from the tanks into sludge steamers and dumped at sea, as is customary in the large coast cities of Great Britain.

In connection with the discussion of treatment methods, the author gives a considerable amount of information concerning the creation of nuisance by existing plants for oxidizing sewage, which will be given as a separate article in another issue. From the information collected and contained in the matter just referred to, the author concludes that where large volumes of sewage are to be treated in sprinkling filters, only fresh sewage should be applied to the filters or else they should be placed far from habitable property.

The line of distinction between fresh and stale or septic sewage seems, from the investigation referred to, to be a distance of six or eight miles from the center of population to the disposal plant under ordinary conditions and in warm weather. That is, if a flow of more than six or eight miles is required for sewage to reach a treatment plant, it is likely to arrive there in a stale condition. In planning for 40 years ahead, the sewers must, of course, be adapted for volumes of flow very much larger than those that they will carry for the first few years after construction; and if the calculated velocity for the sewer floating half-full is three feet per second, it is quite probable that the average velocity for the first few years may not exceed 1½ feet, and consequently the time required for reaching the treatment plant be twice as long as that 40 years hence. It may, of course, be that, during the first few years, even if the time of flow permits the formation of septic conditions in the sewage before reaching the treatment plant, the plant itself will be at a considerable distance from the nearest inhabited section; and that, by the time the population has advanced near enough to the plant to be affected by odors from it, the amount of sewage, and consequently the velocity, will have increased so as to cut down the time of flow to a safe limit.

*Concluded from page 580.

Concerning the matter of discharge of effluent, Mr. Allen considered the suggestion of discharging during the ebb-tide only, as is done at the Moon island outlet of the Boston metropolitan sewers; under which condition all of the sewage would be carried into the ocean and none would enter the bay except such highly diluted sewage as would return through the inlet with the flood-tide. This he considers to be undesirable for several reasons: "In the first place, the storage of sewage already several hours old for six or more additional hours will bring about septic conditions, resulting in objectionable odors about the tanks and in the neighborhood of the effluent after discharge. The concentrated discharge of 12 hours' sewage within a period of less than half that time will intensify the pollution throughout the sewage field to a very great degree. Finally, the unfavorable effect of this intensification is further increased by the greater and more immediate demand made on the available supply of dissolved oxygen in the waters of the inlet by the introduction of a septic effluent than would obtain with the addition of an equal volume of fresh sewage, so that, for all practical purposes, the result would be equivalent to the discharge of a much larger volume of sewage than proposed. The cumulative deleterious effect of an intermittent discharge after storage is very evident to one crossing the sewage field below the Moon island outlet, although it is but fair to say that these conditions are both temporary and local and in a locality where there is little navigation. Yet another objection lies in the fact that the discharge of the sewage in from one-half to one-third of the time would necessitate the construction of extensive and costly storage tanks, with effluent channels and outlet pipes of from two to three times the capacity otherwise required."

For these reasons he believes that the suggestion may be dismissed without further comment; although it is possible that others will not consider the reasons to so convincingly demonstrate the undesirability of the practice.

He suggests the possibility of avoiding a nuisance near the treatment plants due to septic sewage by covering the tanks, as is done at London and Frankfort; and by covering the sprinkling filters, as is done at Mt. Vernon, N. Y. He also suggests the possibility of supplying the sewage with oxygen during transit by aeration or otherwise so as to effectually prevent septicization. "The effectiveness of the first two remedies is questioned in the case of very large works and in any case would not affect questions of potential subsequent nuisances due to the effluent, while the efficiency and economic aspects of aeration are somewhat problematical."

It is possible to appreciably reduce the putrescible material in the effluent by fine-screening the sewage near its source, as is done to a certain extent in both Paris and Berlin.

Concerning the disposal of sludge, the volume that will be produced at the main sewage treatment plant, at which will be treated 272,000,000 gallons of sewage per day, is estimated to be 10½ times the population served in thousands, or 22,575 cubic feet. This would be wet sludge of perhaps 80 per cent moisture. By providing drying beds giving 0.4 square feet per capita area, or 20 acres for a population of 2,150,000, the sludge may be reduced 60 per cent by air drying, producing 335 cubic yards per day of dried sludge.

The gas given off by Imhoff tanks would be large in volume and could possibly be put to some use. The amount varies greatly with the temperature and with details of operation. At the Peachtree creek plant at Atlanta, Ga., 3,750 cubic feet of gas are produced per million gallons of sewage, which is utilized for heating

purposes and other uses about the works. If, in the cooler climate of New York, we allow 3,000 cubic feet per million gallons, this main plant would ultimately furnish over 800,000 cubic feet per day. The gas, which is chiefly methane, contains from 587 to 839 British thermal units. It is worth considering whether the energy available in this gas cannot be used for purposes of power, heating and lighting at the plant and used in the pumping station, which it is proposed to locate close by.

Since the water in those parts of the bay furthest from the inlet experiences the least effect from the replenishment of the water by tidal movements, the sewage discharged at these points must be more thoroughly treated than that discharged at the inlet. It is therefore assumed that sewage discharged at such points will be subjected to some sort of oxidizing treatment in addition to sedimentation or screening.

DESIGNING THE SEWERS.

The author discusses the question of whether the sewerage system should be upon the separate or the combined system, and concludes that the separate should certainly be selected; although it is possible that some sewers ultimately to be used as mains of the separate system may be used temporarily for removing a greater or less amount of storm waters, overflows to streams and shores being provided for the escape of the surplus at times of heaviest rainfalls. It should be made perfectly plain, however, that such use is to be only temporary and that, whenever called upon, the citizens must disconnect their rain-water leaders from these sewers.

A large part of the sewage of this district will need to be pumped, and all of it will need to be treated, and this furnishes a most forcible argument for the adoption of the separate system, since both pumping and treatment can be performed more economically and effectively by avoiding the great fluctuations that occur in the storm flow of combined sewers. For this reason, the entire city of Baltimore has recently been sewered on a strictly separate system, as first advised in 1881 by Charles H. Latrobe and, so far as is known, with its advisability never having been questioned. New Orleans is another large city that has recently completed its sewerage on the separate system. In most of our important towns, such combined sewers as exist were built before the idea of separating domestic and storm sewers had been suggested. In 1908 Rudolph Hering, in a report to the president of the borough of Manhattan, recommended the entire reconstruction of the sewers of that borough on the separate system. C. D. Hill, superintendent of the bureau of sewers of Chicago, after a year's investigation of the reconstruction of sewers necessary for the "loop district," gave as his opinion that "It is necessary to completely separate the storm water from the sanitary sewage. Storm drains should flow by gravity to the river, have no siphons and be of ample capacity. . . . Sedimentation basins to intercept the sludge near the rivers are recommended. . . . A separation of the rainwater ducts and the sanitary sewers of buildings should be effected." In Worcester, Mass., the separate system has been superseding the combined system so that in 1915 there were 106 miles of separate sewers, as against 69 miles of combined sewers, there being 59 miles of storm water sewers. All the recent extensions in Fitchburg, Mass., Rochester and Milwaukee are being built on the separate system, while in the smaller cities and towns of this country the separate system is almost universal.

Where the combined system has been once established in a large city, there is no instance known to the author where it has been entirely abandoned, because of the great difficulty and expense entailed. Five or six years ago, Pittsburgh, when considering the treating of its sewage, had a careful estimate made by N. S. Sprague, chief engineer of the Bureau of Construction, of the cost of entire reconstruction of the separate system. This estimate gave a total cost for the sewers proper of $4,393,407, and in addition to this $1,340,100 for house connections and $8,078,220 for changing house plumbing. This totaled $156.11 per building or $2.94 per lineal foot of sewer. To each of these costs 15 per cent was added for engineering, inspection and contingencies. Such changes have been made, however, under specially urgent conditions. For example, in about 29 acres near Canal street, Manhattan borough, New York, it has been decided to put in the separate system to provide deeper and better cellar drainage. The separate sewage will then need to be pumped, the storm water discharging by gravity at a higher level as at present.

The size of the plant, Mr. Allen believes, should be calculated for not less than about 40 years ahead. Although any forecast for more than 25 or 30 years ahead is liable to more or less error, he considers that works of the permanence and magnitude of those under consideration should be designed to serve for at least that period of time. As a general proposition, the smaller the place and the larger the percentage of unoccupied territory which will probably be developed, the greater is the risk in expending large sums far in advance of their actual need and the greater is the burden on the population to meet the original costs. For this reason the plans for the Brooklyn portion of the area were based upon the estimated 1960 population, while those for the areas in Queens county, where the development has not progressed as far, is based upon the 1950 population.

Considering the matter of seepage, since some of the sewers in the systems have already been in existence for a number of years and some will be new, some will be well-built and probably some of the older ones poorly built; some will be located in dry soil, and others in wet and porous material, the author assumes, without attempting to classify the conditions favoring infiltration, that this will amount to about 40,000 gallons daily per mile of sewer. It is further assumed that, after being fully developed, there will be 25 miles of sewer per sqare mile of territory, so that the infiltration may be taken as one million gallons daily per square mile, or .0024 cubic feet per second per acre of territory drained.

In designing interceptors and treatment plants, he assumes that the maximum rate of dry weather flow will be equal to the infiltration plus one and one-half times the mean water consumption; but as a safety factor to provide for unforeseen contingencies and also to care for the first flush of storm water brought down by combined sewers, the capacity of interceptors and treatment plants is calculated by using one and one-half times the infiltration of ground water plus twice the mean dry-weather flow of domestic sewage.

The hydraulic grades for the sewers are calculated by the use of Kutter's formula with a friction coefficient of 0.013 for cast iron or vitrified clay pipe, and 0.015 for concrete or brick work. For minimum velocity in interceptors, Mr. Allen recommends 2.25 to 3.3 feet per second when running full or half full, the higher rates applying to the larger sizes approaching the place of disposal. "In this way the head is conserved where gradients are necessarily high, while there is a material economy in the smaller diameters and but slight loss of head in adopting the higher velocities where very large sizes are necessary. There is the further advantage that an increasing velocity toward the outlet will tend to prevent the accumulation of deposits."

PAVING PRIVATE ALLEYS IN BALTIMORE.

Beginning in the latter part of 1915 and the first of 1916 a general campaign for cleaning up all the alleys in the city of Baltimore, Md., was begun. The Health Department was notified to inspect and report on all of the alleys, first giving the property owners the right to improve them. If same was not complied with after notice was given, then the Health Department was to issue an order for the paving of said alleys on the highways engineer.

During the year 1916, 396 alleys one square long or less were paved under orders from the Health Department by the highway engineer, R. M. Cooksey. During 1917 and to date there have been paved 1,976 alleys one square long or less.

These alleys are being paved with a six-inch concrete construction and are being done under contract, the cost therefor varying according to the lowest bids of the contractors, which in turn varied greatly on account of increase in cost of labor and materials due to war conditions.

The first alleys paved—that is, those alleys contained in contracts from one to twelve—averaged approximately 85 cents per running foot. This covers all the cost, such as advertising, surveys, engineering, search of records for property owners, paving, etc. Due to increased cost of materials, as stated above, the alleys paved under the next twelve contracts averaged about $1 per running foot. And for the same reason the alleys now being paved will cost the property owners approximately $1.15 per running foot. These prices are based on an alley ten feet wide, and include a five-year guarantee covered by bond.

The total alleys estimated to be handled under the private alley paving program, was 3,000 alleys one square long or under. This will probably be slightly increased on account of the alleys opened in the annexed portion of the city since arriving at these figures.

The city expects to complete this year in the neighborhood of 2,200 of the total outlined above, leaving approximately between 800 and 1,000 to be done during the year 1918.

ADMINISTRATIVE WORK AT CAMP MERRITT*

Organizing the Force and Coordinating All Branches of Work to Secure Completion of Cantonment for 30,000 Men in Three Months.

The firm of Nicholas S. Hill, Jr., and S. F. Ferguson, consulting engineers of New York, was appointed to take complete charge of the construction of Camp Merritt on August 10, 1917. This was one of three or four cantonments in which the entire construction was placed in the hands of one engineer or firm of engineers. In all of the other camps the engineers had partial control of the work, or in some cases acted in a consulting capacity; but experience with all three plans has, we believe, resulted in the conclusion that the plan of giving complete supervision to one engineer or firm of engineers has produced best results.

The problem confronting the engineers at Camp Merritt was the construction of approximately 800 buildings, general plans for which were provided by the Government, and supplying them with all the necessary public conveniences such as streets, water, sewers, electric light and railroad facilities. These buildings had to be placed upon a specified area in accordance with a general city plan. Part of the area selected was timbered, part overgrown with underbrush, and other parts were occupied by about a dozen residences and several other buildings, each surrounded by a greater or less area of developed property. The area was traversed by two main highways, which form the north and south and east and west axes of the camp. There were also several short tributary public streets. All of these public highways have been closed to public use by consent of the local authorities, but have been retained as the main thoroughfares of the cantonment.

All of the work was done under general rules outlined by the Government in Washington with relation to design and materials of construction. For example, the per capita consumption of water to be provided for was specified, and the basis upon which the sewer sizes were to be computed was fixed. Vitrified tile pipe was specified for sewers, wire-wound wood-stave pipe for water mains, and galvanized wrought-iron pipe for water house-service connections. The standardization of design resulted in a saving in the time required for local designing; and by standardizing in advance the character of materials to be used and by placing orders for these materials and holding them in reserve, prompt and certain delivery was much facilitated. In fact, by such standardization the Quartermaster's Department was able to know in advance that a certain minimum amount of certain kinds and dimensions of lumber, pipes, etc., would be required, and these had already been ordered and many of them were on the ground before the plans had been completed.

The completion of the camp ready for use in the shortest possible time was the first and most important consideration. In order to effect this, a most careful coordination of all branches of the work was necessary, and so well was this done that it may be said in a general way that all branches of the construction were brought to completion at about the same time, **all having been practically finished three months after the appointment of the engineers,** with the exception of about 10 per cent of the buildings.

While working details were being prepared by an office force in the New York office of Hill & Ferguson, a completed organization for carrying on the construction was being perfected and put to work. This organization had to be such as to carry on simultaneously the construction of railroad branches and sidings, roads, buildings, water and sewerage systems, fire protection, lighting, heating, plumbing, etc. In general, each of these required the attention of three branches of the organization—designing, construction engineering, and inspection of materials and of construction. When the force was fully organized it contained between 125 and 130 engineers and inspectors.

Meantime the city planner had been completing the general layout of the camp, the grouping of the buildings and location of main roads and of company streets. As soon as this plan had been completed, the streets were laid out upon the ground and profiles of them taken. By use of these profiles the design of the sewerage system was prepared, the elevations obtained by the survey being used also for preparing a topographical map of the property. Following this, excavation was at once begun of the trenches for the sewers and water mains and the laying of these was prosecuted as rapidly as possible. At the same time the buildings were staked out for the contractor as fast as he was able to put men on their construction. Engineers and contractors who have been engaged on large pieces of work will appreciate the celerity with which the preliminary work was carried forward when we state that actual construction was begun ten days after the engineers were notified of their appointment.

One of the first matters was the provision of temporary

*A description of the construction of this cantonment was given last week.

N. E. CORNER OF THE CANTONMENT GROUNDS, AUGUST 22D.
Taken from the intersection of two of the existing roads.

SAME AREA AS ABOVE, TAKEN AUGUST 29TH.
Foundation piles have been driven and framework is under erection.

SAME AREA, TAKEN AUGUST 30TH.
Note progress made in twenty-four hours.

BUILDINGS ONE BLOCK FROM AREA SHOWN ABOVE, AUGUST 27TH.
Photograph taken seven days after contractor began work.

water and other sanitary systems for the laborers, which, of course, could not wait for the completion of the permanent systems. (These were referred to in the previous article.)

In order to keep track of the rate of progress of each class of work, a progress chart for each of them was kept up with daily entries, so that the engineers could know at any time what percentage of the buildings, water mains, sewers, etc., had been completed to date, what percentage of each class of material had been received, etc., so that special pressure could be exerted in whatever direction it seemed most necessary.

The organization formed by the supervising engineers was in charge of Nicholas S. Hill, Jr., as supervising engineer, who directed the work. It was divided into four departments—executive, designing, construction and city planning. The executive department was in charge of S. F. Ferguson; the designing was done by Stuart K. Knox, of the firm of Hill & Ferguson, who was assisted by John N. Brooks as principal assistant; construction was directed by Charles E. Wells, and Robert Wheelwright was city planner.

The executive and designing work was done in the New York office of Hill & Ferguson. The field office under Mr. Wells was organized as follows: Mr. Wells had under him two assistant resident engineers, T. C. Atwood in charge of construction, and Otto Ten Eyck in charge of the office force. Reporting to Mr. Atwood were the several department heads as follows: F. G. Bennett topographic engineer in charge of topography, location and grades; H. A. Coussirat, engineer in charge of sewers; J. A. Ryan, engineer in charge of water supply; L. F. Duke, engineer in charge of electrical work; F. C. Breiby, engineer in charge of building construction; H. J. Atticks, engineer in charge of plumbing and heating, and F. B. Huntington, chief inspector of materials. To each of these department heads were allotted a sufficient number of assistants and inspectors to properly oversee the work. Reporting to Mr. Ten Eyck were the office engineer, F. K. Stebbins; the chief draftsman, L. C. Henderson, in charge of field drafting; the stenographic bureau, and the material-accounting bureau, in charge of William Briscoe. The material-accounting bureau kept track of all bills of materials, orders, the arrival of materials, amount on hand, etc.

The supervising engineers used as their field office one of the residences already existing upon the ground, while another was occupied by the contractor and a third by the quartermaster's department, these three being comparatively close together. Each of these contained telephones, and as construction was begun in each section of the camp, a temporary contractor's office was erected and provided with a telephone so that each part of the work was connected by telephone with each of the three offices, and these in turn were connected with the New York offices. Automobile runabouts were used for carrying the engineers, superintendents, etc., from one part of the area to another, and every other modern facility was employed for speeding up the work except that of working both night and day gangs. The hours for the engineering force were from eight in the morning to six at night, but it was not at all uncommon for a greater or less percentage of the force to work until nine or ten o'clock in the evening, and Sunday work was found necessary by the engineers during the entire period of construction to permit them to catch up with their work.

The entire work was in charge of Major D. G. Stivers, Q. M. C., Mont. N. G., A. Q. M., U. S, A,, who reported directly to General I. W. Littell, in charge of cantonment construction in Washington. Major Stivers was the government representative on the ground and all plans had to be approved by him and orders for materials of all kinds were issued by him on requisition made by the engineer or contractor. The constructing quartermaster had reporting to him, in addition to the supervising engineer, MacArthur Bros. Company, the contractors, and the division auditor, Alfred Rose, who had charge of all the construction accounting and the issuance of all vouchers and warrants for the payment of the work. Representatives of engineers, quartermaster, contractor and auditor were constantly on the ground, and every facility, including telegraph, long distance telephone, and other time savers were utilized to expedite the work, so that no delay was occasioned by this system of control.

It is evident from the celerity with which the work was done that there must have been the greatest harmony between departments and also the most admirable systematizing and coordination of all branches of the work by quartermaster, engineers, contractor and all others concerned.

ANOTHER LIBERTY BOND CITY.

We are informed by city clerk J. G. Crawford that Franklin, Pa., can be added to the list of smaller cities that have bought Liberty Bonds. This city has taken $7,000 of the first issue and $5,000 of the second, and expects to subscribe to the third issue when that is offered.

MOTOR TRUCKING, PITTSBURGH TO NEW YORK.

Steel is being brought from Pittsburgh, Pa. to New York City by motor truck, not a few loads only as an emergency measure, but as a regular practice because of the freight congestion on that route. The material so carried is for the construction of the subways in New York, the completion of which has already been delayed five or six months by war conditions. Freight congestion was not the only condition causing delay, the federal government having taken for war purposes material completely fabricated for subway purposes and ready for shipment. It is a sign of the times that large quantities of steel can be brought by motor truck over this 450-mile route without prohibitive cost.

OFFICERS' QUARTERS, SEPTEMBER 11TH.
Three weeks after the contractor began work.

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Contributions suitable for this paper, either in the form of special articles or as letters discussing municipal matters, are invited and paid for.

City officials and civic organizations are particularly requested to send to Municipal Journal regularly their annual and special reports.

Information Bureau.

Municipal Journal's Information Bureau, developed by twenty-one years' research and practical experience in its special field, is at the command of our subscribers at all times and without charge.

A TEST OF WAR TRUCKS—AND ROADS.

The War Department last week announced that it is its intention to send to the seaboard under their own power the 30,000 army trucks that are now under contract in Toledo, Indianapolis, Dayton, Cleveland and several other cities. The first 30 are believed to be under way at the time this is being written and will probably reach their port of departure before it is read. Each will carry a full load of munitions. This will not only relieve the railroad transportation congestion, but will train the drivers, test out the trucks, and demonstrate to the public the possibility of carrying merchandise to shipping terminals over long distances.

We have little doubt about the trucks standing the test—but how about the roads? About 2,000 miles of roads will be used by these trucks, and it is stated that a part of this distance must be reconstructed to stand this use, while 50 per cent must be put into proper condition, and all must be kept so by careful attention. The War Department will cooperate with the states in this work, and we thus see two thousand miles of road classed as a "war necessity."

But the "Food Department" has an equally important transportation problem; for food is even more necessary than munitions "over there," and is the most important problem at home. Why should not it also map out routes necessary for food transportation and make them also war necessities? They are even more essential than the war truck routes, for many of them must carry food from districts that are not reached at all by railroads. We are learning by costly experience what it means for the railroads to fail under the increased service demanded of them. Will we have to suffer even greater inconvenience from highway insufficiency before the authorities will awake to the fact that within certain limits—and by no means narrow ones—the upkeep and construction of roads is even more important than the construction of munitions?

SNOW AND STREET TRAFFIC.

Through a large section of the country an amount of snow has fallen which is unusual for so early in the winter. It suggests the desirability of the adoption by all cities of any size, and especially by those in which the interruption of street traffic would interfere with the forwarding of war supplies, of some method of alleviating as far as possible the interference with traffic caused by the snow on streets and sidewalks. In a few of the larger cities, the snow is removed entirely from the main thoroughfares as rapidly as possible; but even in these, the interference during the one to four or five days required for cleaning the roadways is often a serious matter.

In these large cities, as described by us several times within the last two or three years, the use of the snow plow has been found to be of great advantage in clearing at least a sufficiently wide section of the roadway to permit the free passage of two lines of traffic, one in each direction; the snow removed therefrom being pushed into a winrow either in the center of the street or one on each side. The latter plan prevents vehicles drawing up along the curb and shuts off access from the roadway to stores or other buildings, for which reason the middle winrow is better for retail commercial districts. The expense of this is not considerable, and we would suggest that many of the smaller cities might find it desirable to treat their main streets in the business districts in this way after each snow storm. After the heavy storms, the collecting of garbage and ashes is rendered very difficult by the heavy going, and but little time would be lost if the teams or motor trucks used in making the collections were withdrawn from this service for one day and used for operating snow plows in the way suggested.

There is another use of the plow which, so far as we know, has not been adopted by any city, but which suggests itself to us as worth a careful trial. An inspection of almost any street other than a main thoroughfare after a heavy snow-fall will show that practically all vehicles are following in the single trackway made by those which first passed through the street after the snow-fall, and that the automobiles are quite generally provided with wheel chains. We therefore have the roadway subjected to a concentration of all traffic wheels on two strips, each about six inches wide, some of these wheels being made still more destructive by the chains thereon. It is no wonder, therefore, that, after the passing away of the snow in the spring, the roadway shows that the winter traffic, although less in amount than the summer traffic, has done very much more damage to the roadway by wearing ruts into it; ruts frequently so deep that the entire roadway must be repaired if it is to be put into good condition again. If winter traffic could be compelled to spread itself more generally across the road, much of this damage could be prevented. This distribution of traffic might be effected by passing a snow plow over the street once every day or two while the snow is on it in such a way as to fill in the ruts, and even to bank the snow above the ruts so as to discourage the running of wheels along them. In addition, this would keep the roadways in better travelling condition for the same reason that the drag scraper used on a rutted

road produces this result. Such use of a few snow plows (one or two in a small city would be sufficient), drawn by the horses which are regularly used in street cleaning or other services which are interrupted by the snow, would add little to the expense of the street department for either plant or operation.

A further use of the snow plow and of horses otherwise idle which has been adopted by several cities (and which practice is, we believe, increasing) is the opening up of sidewalks. Property owners are of course expected to clean the sidewalks, but are usually allowed 12 to 24 hours to do so, while in practice several days elapse before all walks are cleaned. It would be to the great convenience of a large percentage of the citizens if snow plows were used early each morning on the sidewalks of the principal pedestrian thoroughfares. If it is argued that this gives an advantage to property owners along such thoroughfares by cleaning their sidewalks and not those on other streets, this might be met by charging a certain amount against the frontage of all such property for such sidewalk cleaning, on the same principle that such charges are made in some cities for sprinkling the streets in summer. One horse and plow can easily put into passable condition one and one-half or two miles of sidewalk in an hour; and by starting by 6 o'clock in the morning, could thus clean three or four miles of sidewalk before the citizens start for business along these main thoroughfares.

MUNICIPAL WORK AND WAR NECESSITIES.

Efficiency is a matter that has been much talked about during the past five years and much has been done to introduce it into all branches of industry. But heretofore efficiency has generally meant the obtaining of the maximum result from the minimum amount of wages paid. If a man was not satisfactorily efficient, he was discharged. Efficiency now must proceed along somewhat different lines. Labor has become scarce and it is not so easy to replace unsatisfactory employees with those that are more efficient, and more effort will need to be used to increase the efficiency of those we already have.

Some men are inefficient because they will not be, other because they cannot be; and many are of the opinion that the proportion of the latter to the former is increasing, since so many of the more efficient are being absorbed by the army. Among the causes of constitutional inefficiency, and many claim the most important of these, is poor health and low vitality. To the extent that these are inherited, little can be done to remedy them this year or before the end of the war; but in so far as they are occasioned by inadequate food or unsanitary or otherwise unfavorable surroundings, an immediate improvement should be possible; at least, we can prevent any deterioration in conditions leading to such results. A very large percentage of our citizens live in cities, and it follows that the sanitary condition of our cities becomes even more important now than it has been in the past.

If the maintaining and even the improving of such municipal conditions is recognized as a war necessity, then there can be no escaping the conclusion that a certain amount of municipal work is as essential to the winning of the war as the manufacturing of munitions or the raising of food. It is easily demonstrable that two efficient laborers will turn out as much and better work, with a less amount of invested capital in the form of machinery and other plant, than will three inefficient ones. If, therefore, by removing from those who are laboring directly upon war munitions and food only 5 per cent of those now employed, we can increase by one-third the efficiency of the remainder, we have increased by more than 25 per cent the output possibilities of existing labor.

It cannot of course be claimed that improving municipal conditions will increase by this percentage the efficiency of *all* laborers, or even of half of them; but on the other hand we are convinced that if conditions are allowed to deteriorate, the output of all will suffer from lowered vitality and general inconvenience more than is generally realized. England has had three years more experience of war conditions than has the United States, and in a lecture by one of the most prominent of its municipal engineers, H. Percy Boulnois, a few weeks ago, this authority placed emphasis upon the importance of continuing municipal work. Among other things, he stated that a bad road is an unsanitary road, as both mud and dust are detrimental to public health; and for the same reason, street cleaning is essential, and the removal of house refuse. War conditions have also thrown unusual burdens upon the sewerage system and sewage disposal plants, both by increasing the number of men employed in those sections where munition factories were most numerous, thus making necessary the extension of sewerage and water supply systems, and also by the enormous increase of trade wastes that are discharged into the sewers and generally tend to cause deposits and over-burdening of the capacity of them and also interfering with the treatment of the sewage in existing plants as well as over-burdening such plants. In spite of which, the efficiency of the sewer systems must be maintained.

The value of numbers of efficient laborers was never so great as now, and nothing is being done in this war which seems to be more important than conserving and improving the health of all who are remaining here as well as of those who will within the next year or two be sent to the other side for strenuous fighting. Great stress has been laid upon the enormous improvement made in war sanitation within a few years. During the Boer War there were 17 cases of disease in the English army to one case of wounded men, while in this war these figures have been almost reversed. It has been stated time and again that this is a war in which the workers are as important as the men on the battle-front; it therefore must be equally as important that we conserve the health of those at home as carefully as we have that of those in the field.

Reduction in amount of municipal work will undoubtedly be necessary, but it is more than ever the duty of municipal officials to see that no work is allowed to be suspended or left unperformed which is essential to the physical well-being of the community. This means that sewers must be built where there are houses to be sewered; water distribution systems must be extended and pumping and other facilities increased where there is an increase in population; streets must be kept in repair and kept clean ; refuse must be removed from inhabited districts and disposed of in a sanitary manner; building departments must be maintained to insure that new buildings conform to the building regulations and that the condition of old ones be maintained; boards of health must continue their oversight of the sanitation and food of their communities; and in a score of other directions the city must continue to perform those functions which are essential to the health and vital energy of all its inhabitants—men, women and children. Men and women, for they are all needed in our industries; children, for they will in a very few years be so needed. And this refers to the poorer quarters as well as those in which the wealthier reside, for from the former we must draw their quota of healthy, vigorous soldiers as well as

laborers. No unnecessary municipal work should be carried on from now until the war is won; but the most serious consideration should be given to the decision as to what work can be omitted as unnecessary to the physical well-being of the millions whose health and lives are in the keeping of municipal departments and officials.

WASTE-PAPER COLLECTION IN GLASGOW.

In 1900 Glasgow established a cleansing department for collecting the city refuse and utilizing waste products. One of the principal branches of this department is devoted to the collection of waste paper. During the past ten years the city has profited to the extent of nearly $44,000 from the sale of the waste paper, the revenue from this source in 1907-8 having amounted to $3,010; in 1908-9, to $3,120; in 1909-10, to $4,215; in 1910-11, to $5,725; in 1911-12, to $4,765; in 1912-13, to $2,315; in 1913-14, to $2,675; in 1914-15, to $2,950; in 1915-16, to $1,360, and in 1916-17, to $13,590.

The collection of waste paper from the city offices, warehouses, and better-class dwellings was originally introduced, apart altogether from the financial phase, with a view to curbing as far as possible the nuisance inseparable from the removal of paper from the public streets and in order to get hold of the material before it reached the dust bins and ash buckets. Bags for holding the paper, measuring 32 by 40 inches, are issued to business premises, etc., and are called for regularly by employees wearing a departmental armlet. The contents of these bags are emptied into larger receptacles for removal to the paper mills. By means of this system the paper is not only kept off the streets, but, being collected separately from the refuse, it forms a marketable commodity and becomes a source of revenue, as set out above.

In view of the Government's prohibition of the import of wood pulp, and consequent scarcity and increased value of waste paper, steps have been taken by the local city officials to collect waste paper on a much more extensive scale, even to the extent of salving all material picked out of the refuse at the various city garbage plants. The department is receiving valuable assistance from an organization known as the Women's Volunteer Reserve, the members of which engage in a door-to-door collection in certain districts of the city. In return for the services thus rendered the organization receives 20 per cent of the revenue derived from the paper so collected. An effort is also being made to reach the dwellings of the working classes through the medium of the school boards and pupils.

The service in this city is absolutely free. No charge is made for the use of the bags or for carting the paper away. All waste paper is sold, at Government-controlled prices, to paper-stock merchants in the condition in which it is collected. The total quantity collected and sold during the past fiscal year was 835 tons, the revenue realized therefrom amounting, as stated, to $13,590. It is interesting to note that about ten times as much paper was collected during the past fiscal year as during the preceding one. For the first three months of the current financial year 342 tons were collected, with a total value of $11,155. It is reliably estimated that the total value of the paper collected during the present financial year will reach $50,000.

OREGON HIGHWAY WORK.

The Oregon State Highway Department reports that during 1917 it laid by force account a little over two miles of concrete pavement at a cost of $1.72 per square yard, the pavement being 16 feet wide. At the beginning of the season a contractor had offered to do the work at 15 cents a square yard less, but the work cost more than was estimated because of the difficulty of obtaining material promptly and the scarcity of labor.

Within a few weeks the commissioners have bought a paving plant for $13,500 for the purpose of doing a considerably greater amount of work by force account during 1918. This will not, it is believed, enable it to do all the road work, one commissioner stating that ten plants would be necessary for this.

NEGLECT OF SEWAGE TREATMENT PLANTS.

Last summer J. H. Dunlap, associate professor of hydraulics and sanitary engineering at Iowa State University, investigated the municipal water, sewerage and sewage treatment plants in the state of Iowa. In the 2,300 cities, towns and villages he found about 450 water works plants, 180 sewerage systems and 100 sewage treatment plants. Regarding the sewage treatment plants he reported: "Of the thirty-seven plants visited only three can be said to have been in good condition. All three of these plants had features needing immediate attention, but in general they were giving excellent results. The other thirty-four plants were either not being operated properly or were so badly overworked as to make first class operation impossible."

FIRE APPARATUS MILEAGE

Mileage Made During the Year by Each Kind of Motor Apparatus—In Each of Several Hundred Cities and Averages of All.

The mileage of fire apparatus in several hundred cities, as reported by fire chiefs, is given in the table published last week and this. The mileage reported by the several citise and villages varies enormously, the least being 5 miles (probably occasioned by only two or three fires during the year), while the maximum reported was 35,000 miles for a chief's car (an average of nearly 100 miles a day) and several exceeded 10,000 miles. These figures seem very high, but we give them as reported.

We have calculated the averages for each kind of apparatus, and in the accompanying table give these averages, the number of cities whose figures are included in the calculation, and the maximum and minimum figure reported.

Next week we will give tabulated figures of the miles run per gallon of gasoline by each piece of apparatus, as reported by each of the cities.

Mileage of Different Kinds of Apparatus.

Averages of all cities reporting.

Kind of Apparatus.	No. of cities averaged.	Mileage run—Average	Maximum	Minimum
Chiefs' cars	99	5,151	35,000	15
Chem. & hose with ladders	156	315	1,500	15
Chem. & hose without ladders	49	420	4,000	15
H. & L. trucks	91	345	3,000	6
Triple combinations	66	358	1,800	30
Hose wagons	51	380	3,000	10
Tractors	22	242	9,000	100
Chemical engines	21	561	3,000	25
Gas-pump engine & hose	55	394	4,000	65
Gas-pump engines without hose or chem.	12	317	800	65
Gas-pump engine with chem.	8	328	600	150
Gas-driven steam pumper	15	213	800	5
Fuel or service wagons	9	1,835	7,500	75
Repair wagons	11	3,114	11,000	200
Squad wagons	11	838	2,500	75
Water towers	3	66	92	25

AVERAGE MILEAGE PER YEAR MADE BY MOTOR APPARATUS (Continued).

City and State.	Chief's Cars.	Chemical & Hose With Ladders.	Chemical & Hose Without Ladders.	H. & L. Trucks.	Triple Combinations.	Hose Wagons.	Tractors.	Chemical Engines.	Gasoline Pumping Engine & Hose.	Gasoline Pumping Engine Without Hose & Chem.	Gasoline Pumper With Chem.	Gasoline Driven Steam Pumper.	Fuel or Service Wagons.	Repair Wagons.	Squad Wagons.	Water Towers.
New Mexico:																
Raton	1,500	....	500	....	....	....	....	....	....	....	....	....	....	....	....	....
Roswell	5,000	650	....	....	....	500	....	....	....	....	....	....	....	7,000	....	....
New York:																
Auburn	225	175	....	175	....	....	....	....	....	....	....	....	....	....	....	....
Batavia	....	60	....	60	....	....	....	....	....	....	....	....	....	....	....	....
Canastota	....	40	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Cohoes	2,500	200	200	250	175	....	100	....	175	....	....	100	75	....	....	....
Corning	....	....	350	....	350	....	....	....	....	....	....	....	....	....	....	....
Freeport	....	75	....	....	....	....	....	....	....	....	....	75	....	....	75	....
Fulton	....	....	125	....	125	....	....	....	....	....	....	....	....	....	....	....
Geneva	150	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Johnson City	3,600	....	200	150	....	700	....	....	....	....	....	....	....	....	....	....
Liberty	....	100	....	....	....	100	....	....	....	....	....	....	....	....	....	....
Mamaroneck	....	300	300	300	300	300	....	....	300	....	....	....	....	....	....	....
Mechanicsville	....	75	....	....	....	75	.. ..	....	....	....	....	....	....	....	....	....
New Rochelle	2,100	1,415	....	177	537	....	....	....	....	....	....	24	....	....	....	....
Peekskill	200	....	200	150	....	....	....	....	175	....	....	....	....	....	....	....
Rye	....	350	....	100	....	150	....	....	....	....	....	....	....	....	....	....
Silver Creek	....	....	....	....	....	12	....	....	....	....	....	....	....	....	....	....
Watkins	....	....	100	....	....	....	....	....	....	....	....	....	....	....	120	....
White Plains	750	120	....	6	....	....	....	....	....	....	....	....	....	....	....	....
Yonkers	3,033	....	676	676	....	....	....	....	676	676	....	....	....	4,300	....	....
North Carolina:																
Durham	6,000	400	....	600	....	....	....	....	....	....	....	....	....	....	....	....
Raleigh	1,000	700	....	675	....	....	....	....	75	....	....	....	....	....	....	....
Ohio:																
Akron	3,000	700	500	300	400	....	400	....	....	....	..	....	7,500	5,000	....	....
Alliance	2,000	100	....	....	300	....	....	....	....	....	....	....	....	....	....	....
Bellaire	....	200	....	....	200	....	....	....	....	....	....	....	....	....	....	....
Bryan	1,275	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Columbus	3,800	292	292	292	292	....	292	....	....	292	....	....	292	292	....	....
Conneaut	....	....	....	....	250	250	....	....	....	....	....	....	....	....	....	....
East Cleveland	6,000	300	....	300	300	....	....	....	300	....	....	....	....	....	....	....
Elyria	1,800	....	....	150	....	....	....	....	225	....	....	....	....	....	....	....
Findlay	2,500	....	....	....	....	....	....	45	....	....	....	....	....	....	....	....
Jackson	....	....	....	....	45	....	....	....	....	....	....	....	....	....	....	....
Lakewood	4,065	608	....	394	....	....	....	....	466	....	....	....	....	....	....	....
Lima	500	180	....	....	....	....	160	....	....	125	....	....	....	....	....	....
Marietta	....	150	....	....	175	....	125	....	....	....	....	....	....	....	....	....
Mt. Vernon	1,000	100	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Portsmouth	25,000	....	....	375	350	....	....	....	300	....	375	....	....	....	....	....
Springfield	1,000	500	....	500	....	....	....	....	500	....	....	100	1,000	....	....	....
Toledo	2,798	....	430	548	124[1]	....	....	....	....	....	....	240	2,000	....	....	80
Warren	6,000	200	....	....	200	....	....	....	....	....	....	....	....	....	....	....
Youngstown	5,000	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Oklahoma:																
Ada	....	300	....	....	230	....	....	....	....	....	....	....	....	....	....	....
Chickasha	100	....	....	....	60	....	....	....	....	....	....	....	....	....	....	....
Miami	....	....	108[2]	....	....	....	....	....	....	....	....	....	....	....	....	....
Oregon:																
Astoria	4,000	100	....	....	....	...[1]	....	....	....	....	....	....	....	....	....	....
Roseburg	1,000	100	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Pennsylvania:																
Altoona	3,000	200	....	....	....	....	....	....	....	....	....	100	....	....	....	....
Bangor	....	....	....	....	100	....	....	....	....	....	....	....	....	....	....	....
Beaver Falls	4,000	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Bradford	....	....	....	....	....	....	....	50	....	....	....	....	....	....	....	....
Carlisle	....	15	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Duquesne	....	....	200	....	....	....	....	....	....	....	....	....	....	....	....	....
Easton	....	100	....	....	350	....	....	....	....	....	....	....	....	....	....	....
Franklin	250	250	....	100	450	....	....	....	....	....	....	....	....	....	....	....
Galeton	....	....	20	....	....	....	....	....	....	....	....	....	....	....	....	....
Girardville	....	250	....	....	....	200	....	....	....	....	....	....	....	....	....	....
Oil City	2,500	....	....	....	....	800	....	....	....	....	....	....	....	....	....	....

Philadelphia	2,500	100	148	169	....	....	148	....	148	....	....	....	....	1,654	....	92
Quakertown	....	....	....	....	....	....	....	....	530	....	....	....	....	....	....	....
Reading	12,000	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Turtle Creek	....	....	....	....	1,800	....	....	....	1,800	....	....	....	....	....	....	....
Tyrone	....	400	....	400	....	....	....	....	....	....	....	....	....	....	....	....
Warren	....	90	....	80	....	50	....	....	....	....	....	....	....	....	....	....
West Berwick	....	....	....	....	30	30	....	....	....	....	....	....	....	....	....	....
Rhode Island:																
Woonsocket	5,000	550	....	450	....	....	....	....	....	....	....	....	....	....	....	....
South Carolina:																
Charleston	5,000	700	..	....	....	....	....	....	300	....	300	..	..	....	....	....
South Dakota:																
Madison	15	15	15	....	....	....	....	....	....	....	....	....	....	....	....	....
Tennessee:																
Clarksville	....	....	1,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Jackson	....	300	....	....	300	....	....	....	....	....	....	....	....	....	....	....
Johnson City	....	185	....	....	215	96	....	....	....	....	....	....	....	....	....	....
Nashville	6,000	....	....	....	360	....	250	....	....	....	....	....	....	....	....	....
Paris	....	100	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Texas:																
Amarillo	3,500	350	....	25	....	....	....	....	300	....	....	....	....	....	....	....
Austin	5,000	....	200	200	....	....	....	....	....	....	....	....	....	....	....	....
Denison	5,000	....	....	3,000	....	3,000	....	....	4,000	....	....	....	....	....	....	....
Georgetown	35,000	1,000	1,000	1,000	....	1,000	....	1,000	....	....	....	....	....	....	....	....
Houston Heights	500	....	500	500	....	500	....	....	....	....	....	....	....	....	....	....
San Marcos	1,600	600	....	....	600	....	....	....	....	....	....	....	....	....	....	....
Victoria	2,000	500	600	500	....	....	....	....	....	500	....	....	....	....	....	....
Utah:																
Logan	1,000	....	200	....	200	....	....	....	....	....	....	....	....	....	....	....
Ogden	2,500	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Salt Lake City	6,300	500	....	250	600	500	250	....	700	....	600	....	....	11,000	800	....
Vermont:																
Bellows Falls	....	200	185	....	....	90	....	....	....	....	....	....	....	....	....	....
St. Johnsbury	....	....	200	100	....	20	....	....	....	....	....	....	....	....	....	....
Virginia:																
Charlottesville	....	....	300	300	300	200	....	....	....	....	....	....	....	....	100	....
Covington	....	105	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Harrisonburg	....	....	300	....	....	....	....	....	....	....	....	....	....	....	....	....
Newport News	3,000	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Roanoke	....	700	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Washington:																
Bellingham	2,000	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Ellensburg	....	500	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Olympia	....	200	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Puyallup	500	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Seattle	6,500	....	....	375	....	545	240	600	65	....	....	145	5,125	....	685	....
Tacoma	1,000	350	....	350	....	....	....	....	300	250	....	300	....	....	....	....
West Virginia:																
Elkins	....	400	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Fairmont	500	125	....	75	....	....	....	....	....	....	....	....	....	....	....	....
Wheeling	....	106	....	115	....	....	....	....	....	....	....	....	....	....	....	....
Wisconsin:																
Appleton	1,500	....	....	175	....	200	....	....	....	....	....	....	....	....	....	....
La Crosse	1,377	300	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Manitowoc	1,600	....	200	....	....	....	....	....	....	....	....	....	....	....	....	....
Merrill	....	110	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Milwaukee	3,022	371	....	410	....	....	323	....	439	....	....	....	....	2,680	408	....
Oshkosh	2,000	275	280	270	....	665	....	....	....	....	....	....	....	....	....	....
Rhinelander	....	200	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Superior	5,000	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Canada:																
Westmount	....	750	....	....	....	....	.. ..	....	500	....	....	....	....	....	....	....

[1]Aerials; [2]blocks.

The WEEK'S NEWS

Meeting Road Problems in Wisconsin and Oregon—Federal Test of Highway Freight Service—Child Welfare Work in Massachusetts—Philadelphia's Sewage Disposal System—Water Waste in Washington—San Francisco Fights Water Company for Impounded Funds—Pittsburgh's Street Lighting Contract—Difficult Fires in Jersey Shore, Pa., Fresno, Cal., Punxsutawney, Pa., and Attleboro, Mass.—New York's Bomb Squad in U. S. Service—New York State Public Service Commission Grants Six-Cent Fare—The San Francisco Car Strike.

ROADS AND PAVEMENTS

Delay Road Building Program.

Madison, Wis.—The special legislative committee which was appointed to make an inquiry into the question of building trunk line wagon roads through the state, and to recommend routes for those roads, has completed its hearings. It has held sessions in every county seat in the state, and routes for the trunk lines are being prepared under its direction. The committee has decided not to use the state good road fund, or the federal aid which is to be granted for the building of roads for any great amount of new road building during 1918, and only trunk line work will be done where it can be accomplished by the building of connecting lines between existing roads. The decision to limit building operations the coming year is due to the high cost of material and the scarcity of labor. When the road building work is really begun, the first road constructed will be directly across the state from east to west, and the road will run eventually from Milwaukee to Prairie du Chien, via the state capitol and Richland Center. There are to be eventually two roads to Madison. Road building work is to extend eventually all over the state, and trunk lines are to be built connecting all the county seats in the state. The committee recommends that considerable money be expended in the maintenance of the state roads already built, and that these roads be put in good repair, and be kept in the best state of repair possible.

Highways to Relieve Railroads.

Washington, D. C.—Major-general Henry G. Sharpe, the quartermaster-general, has announced that the first section of the American Army's new experimental truck transport service has started from Detroit on its way to the Atlantic seaboard. The test is being made in an effort to relieve congestion in freight terminals by the overland use of motor trucks under plans worked out by the quartermaster department and the Highways Transport Committee of the Council of National Defense. If the plan proves successful it is expected that the total relief to the railways through the shipment to the coast under their own power of 30,000 war trucks will amount to 690,000 tons. The trucks have an average capacity of three tons, and only two of them can be shipped by rail in a forty-ton freight car. The new plan will therefore relieve 15,000 freight cars, and will also permit the transportation of 90,000 tons of government materials to the coast from the interior storage depots. Thus 17,250 forty-ton cars may be released. The plan is expected to serve also an urgent need—that of providing adequate opportunity for the training of an effective corps of transport drivers and officers. "Working in close touch with the storage committee of the Council of National Defense, which is helping to work out the efficient mobilization of the varied stores of war at convenient central points, the Highways Transport Committee is laying out a comprehensive system of through routes between the truck production centers, the storage centers and Atlantic Coast ports. The routes which are being selected are those which can most easily and clearly be brought into condition to stand the traffic, and which will lead most directly from the truck production centers to the seaboard. A central main line or backbone military highway will be selected between Chicago and New York City, and leading to this main line feeder routes from the various scattered motor production centers. In the east branch routes will lead off the main line north and south to the various Atlantic coast ports. Officers of the quartermaster department have been for months gathering detailed information in regard to the roads, and the possibility of heavy motor truck traffic over them. On most of our through routes of traffic in this country the government has been confronted with more or less extensive gaps, which are now improved to an extent, allowing heavy truck traffic during the winter months. State and county officials have been called to Washington, and are urged as a patriotic duty in the war emergency to bring the local gaps immediately into suitable condition. The Highways Transport Committee has called upon the various highway authorities for co-operation in the important work of laying and selecting the various routes, and determining upon the points where construction must be accomplished before heavy motor truck transportation is possible. Late in November engineers, representing the Office of Public Roads of the Department of Agriculture, and the Corps of Engineers, United States Army, left Detroit, spent ten days in selecting the most feasible route between Detroit and an Atlantic Coast port. Army officers and war department officials will watch the results of the first motor company's drive of 600 miles with keen interest and upon the success of this trip will depend the extent to which motor truck transportation on the part of the government will be developed. In each state the inspection party was accompanied by a representative of the state highway department, who noted the locations of those sections of route requiring immediate improvement, and action on the part of the states and counties to remedy unsatisfactory conditions has been urged by the Council of National Defense. As the plan develops and is carried to its logical development there will be many ways in which local organizations can assist. Federal routes should be marked in such a way that they can be easily followed by the truck company commanders, even though they will be provided with detailed maps. Arrangements can be made for right of way through any congested centers and a system of expeditious delivery of supplies, gasoline and oil can be worked out. Local bodies can keep commanders of the motor truck companies advised a day in advance, by telephone or wire, of the weather conditions and their possible effect upon the roads so that all precautions may be taken to avoid delay. Altogether, a real opportunity will be provided for definite service to the government, to the public and various civic and commercial organizations along the line, who can, in a hundred ways, aid in making the government's transport service efficient and successful."

Highway Commission Buys Railroad Cars.

Salem, Ore.—With its own paving plant complete, the highway commission will be in position next season to lay about 15 miles of hard surface. In addition to a second-hand plant, bought for $13,500 from the Oregon Independent Paving company, the commission has purchased one second-hand five-ton roller and two 10-ton rollers, one of them new. The big stroke of the commission was in buying nineteen cars from the United States reclamation service for $1,000 each. Owing to the rule of the government that open cars cannot be used for highway material, the commission decided to prosecute its work by purchasing cars of its own and these the railroads will haul. With

them the commission will start as soon as possible shipping crushed rock to the jobs that are to be worked next season, and by having a large accumulation of rock on hand, the jobs can be rushed through the summer without delays for want of material. These cars will also be used for carrying gravel for the Columbia River highway east of The Dalles, from points where there are inexhaustible gravel pits.

Discharges Whole Street Force.

New Haven, Conn.—The street department has discharged 170 men, practically the entire force under superintendent Niar Barnes, because there is no money left in the street account to pay their salaries. Extraordinary expenditures during the year, together with the increased cost of material and increased wages of employes is responsible for the low condition of the street account. There were several expenditures that arose during the year unforeseen when the 1917 budget was made. The board of finance will have to transfer money from some other account to pay for clearing snow away from the central streets after snowstorms during the month.

SEWERAGE AND SANITATION

Federal Health Survey of City.

Fort Worth, Texas.—A sanitary inspection of restaurants, hotels and all places where food and drinks are prepared and offered for sale is being made by assistant surgeon of the United States Public Health Service, A. R. Sweeney, and state pure food inspector Andy Byas. It will include all territory within five miles of Camp Bowie or the three aviation camps. According to Major Oakley, who is in charge of the survey, the work is thorough, and places which do not maintain proper sanitary conditions will not be permitted to sell to soldiers. A sanitary survey of the city is also being made under the direction of chief sanitary inspector E. W. DeGraff, which will include sewer connections, dry closets, etc.

Mayor Directs Health Work in Epidemic Emergency.

Webster City, Ia.—Under the manager law, which gives him the right in case of an emergency to govern the city by proclamation, mayor Clark has delegated to himself authority to place the city under his personal charge so far as all health regulations are concerned. He issued a proclamation declaring the prevalence of diphtheria here sufficiently alarming to constitute an emergency under the law. To meet this emergency mayor Clark and the board of health ordered that cultures be taken from all school children, and that after the culture is taken the child be ordered to remain at home until notified of release. Last month about thirty cases were quarantined in the city. In July there was one case, in August there were three, in September four, and in October fourteen.

Intensive Campaign for Child Life Conservation.

Boston, Mass.—An intensive campaign for the conservation of child life is being launched in Massachusetts by a special committee recently appointed by the commissioner of health, Dr. Allen J. McLaughlin. The members of this committee are authorities on child hygiene and are working in close co-operation with the division of hygiene of the state department of health. It is the purpose of this committee greatly to increase the conservation of child life throughout the state by demonstrating to the cities and towns the necessity for such work. This is being done by sending into the field child welfare supervisors—specially trained in public health nursing as well as child welfare work—to make a careful and comprehensive survey of every part of the state to discover what the actual health conditions are in the different localities. Supervisors have already been sent into the eight health districts of the state, and are working in conjunction with the local health officer and the state district health officer. The plan of the state committee calls for work to be established in providing prenatal care for expectant mothers, a plan which has been proved to have reduced the rate of infant mortality by one-half; for care of women during confinement and for care of the children up to five years. The committee does not expect to establish new agencies for child welfare work except where none exist, but to concentrate every effort on supporting existing agencies, thus extending and strengthening work already begun. The committee will also stimulate interest in the communities throughout the state to provide funds for the employment of trained workers to carry on this public health work. When the special problem of a city or town has been determined by these supervisors a definite effort will be made by the committee to prevail upon that city or town to provide funds to meet that need. As this is a state-wide movement, no town or city will be neglected. In order to carry out the plans of the state committee and to accomplish the best results in each locality, volunteer helpers will be used.

Finds Sanitary Menace in Boom Village.

Hamtramck, Mich.—"Immediate enforcement of the state housing code will go a long way toward solving the communicable disease problem in Hamtramck," according to Don W. Bingham, assistant state sanitary engineer, in reporting a survey of typhoid fever conditions in the village. The Detroit board of health requested the survey because the city now nearly surrounds the village. The state housing code is applicable to villages or towns of more than 10,000. Hamtramck had only 3,559 population, according to the 1910 census, but a special census in 1915 showed a population of 20,000, an increase of 563 per cent. The population now is estimated at 31,000. Regarding sewers, Bingham says: "There is a section of the village, comprising about one-quarter of the total area, whose only public improvement is city water. This parcel contains approximately 3,100 lots, of which 950 are occupied by houses. In this unsewered territory the majority of the 1917 typhoid fever cases have been located." In a history of the twenty-five recorded cases, all but seven of which were in a small unsettled portion, he shows the probable source of infection. Sanitary conditions in the unsewered section of the town are bad, Bingham says. Kitchen and laundry wastes and other sewage are drained into street gutters. Bingham recommends more prompt reporting of communicable diseases by physicians, a fly-tight garbage receptacle ordinance and the prohibiting of outdoor toilets in sewered districts. He urges the villages to employ an infant welfare nurse and recommends that two inspectors of the educational department of the Ford Motor Company be appointed special sanitary officers without pay. A trunk line sewer to take care of the unsewered portion of the village is being built, and the Ford inspectors have obtained signatures for petitions for lateral sewers among the 350 Ford employees affected.

Drinking Utensils Must Be Washed.

Sacramento, Cal.—Drinking cups and glasses used in restaurants, at soda fountains and other places must be washed five minutes in boiling water containing a 5 per cent solution of lye. This is included in new regulations promulgated by the California state board of health for the enforcement of the law governing the sterilizing of drinking utensils.

Progress on Philadelphia Sewage Disposal System.

Philadelphia, Pa.—With the completion of the Frankford Creek intercepting sewer, which the department of public works is pushing vigorously, Philadelphia, and especially the northeast section, will have a method of sewage disposal capable of caring for 275,000,000 gallons a day. This unit includes the northeast sewage treatment works, near the Delaware River; the grit chamber at O and Lycoming streets, and when completed will empty purified sewage two miles farther down stream than the present outlet, now at the mouth of the Frankford Creek and Delaware River, and a point two miles further removed from the intake of the Torresdale filtration plant of the water supply. The sewer is four miles long and is constructed of concrete, mostly in rectangular form, with an arched roof. The general width is eight and one-half feet, and in some places is as high as eleven feet. Behind the grit

chamber the sewer will consist of sixty-six-inch concrete "pipes" for a distance of 6,600 feet. At different points tunnels were made through solid rock, the longest being 1,300 feet. One section of the sewer is above the surface in order to insure the necessary fall. Odors in the sewer have been reduced by half, according to Chester M. Albright, chief of the bureau of surveys, who devised essentials of construction work. When completed the sewer will take over the sewage formerly discharged into the Frankford Creek. This sewage comes from Chestnut Hill and Germantown. The sewage is first carried to the grit chamber, then to the northeast treatment works and from there flows into the Delaware River. It has been estimated that at the present time the Wingohocking Creek discharges into the Frankford Creek about 30,000,000 gallons daily. Much of the area to be drained by this system is still to be built up, and in anticipation of a densely populated section in the future the entire system had been constructed with ample facilities for increased volume.

WATER SUPPLY

Much Waste of Capital's Water Supply.

Washington, D. C.—With some estimates of Washington's increase in population, due to the war, running as high as 50,000 the question of the sufficiency of the capital's water supply is again attracting the attention of officials. Investigation of the amount of water used last month shows an increase of 2,500,000 gallons in the daily mean consumption as compared with the record of November, 1916. Some officials are of the opinion that Congress either must take immediate steps to reduce water extravagance in government departments or provide for increasing the capital's water supply. It is stated that one of the largest departments is supplied through an eight-inch main, which is not metered, and that unquestionably a great deal of water is wasted by the government. The present water supply system is estimated to be sufficient for a population of 500,000 people. At the beginning of the last fiscal year the water department based its calculations on a population of 369,000, but if some estimates are right the number of persons living in Washington now is somewhere in the neighborhood of 420,000. It is estimated that federal buildings and plants waste 4,000,000 gallons of water daily. The department will continue its work, prosecuted so successfully during the past year, of locating and stopping leaks. It detected last year underground leakage from service pipes, mains, etc., of 1,752,600 gallons a day. More than 150 miles of mains were tested, and the underground leakage from street mains was found to amount to 273,500 gallons a day.

City May Take Water From Private Wells.

Ann Arbor, Mich.—The city's proposed pumping station, on the marshes three miles south of the city, will be operated for the purpose of taking water for the city's consumption despite the fact that the taking of the water actually weakens flowing wells and dormant wells of farmers living nearby. So long as the city does not unreasonably make use of the percolating water in the gravel deposits under the marsh, and does not work injury to the other property owners it can go ahead, but if it does work injury and that injury is apparent, it must answer. Such, in substance, is the decision of the supreme court at Lansing in ruling on attempts of land owners in the marsh where Ann Arbor now gets its water to stop all proceedings with injunctions. The injunctions refused by the circuit court of Washtenaw county are refused by the high court, but at the same time notice is served on the city that it cannot go beyond the bounds of reason and by powerful suction drain nearby wells and injure agricultural land. Justice Ostrander, in the opinion, says:

"I have said that in view of the circumstances the right of the defendant, the city of Ann Arbor, to make use of the water is a qualified right. It is qualified by this rule of reasonable user. There is no apparent reason for saying that because defendant is a municipal corporation, seeking water for the inhabitants of the city, it may therefore do what a private owner of the land may not do. The city is the private owner of the land, and the furnishing of water to its inhabitants is its private business. It is imperative that the people of the city have water. It is not imperative that they secure it at the expense of those owning lands adjoining lands owned by the city. It does not follow that the city may not reasonably make use, for the purpose intended, of a large volume of water from this land. I have stated the rule by which the rights of the city and of the other land owners must be determined. Manifestly the city must take the chances of experience."

One Dead in Water Plant Explosion.

Lakefield, Minn.—The water and light plant here is destroyed as the result of an explosion. The plant blew up, killing Peter Nelson, engineer, and injuring three other men. The cause of the explosion is not known, but, according to a newspaper report, the boilers went dry. The blast shook the entire town.

The Spring Valley Impounded Funds Case.

San Francisco, Cal.—Final arguments in the well-known Spring Valley water rate cases involving $2,250,000 of impounded taxpayers' money have been concluded by assistant city attorney Robert M. Searls. Master H. M. Wright's decision turning over this large sum to the Spring Valley company and materially increasing the valuation of the company's properties is now in the hands of federal Judge Frank H. Rudkin for confirmation or rejection. Judge Rudkin indicated that a decision could not be expected before the first of the year. The city seeks a reversal of Wright's decision, to which it has taken 100 separate exceptions. Searls argued that the evidence introduced before Wright did not support his conclusions, and that he made grievous errors in both law and equity. Searls claimed that the rating basis adopted by Wright placing the value of the Spring Valley properties at $39,000,000 was at least $10,000,000 in excess of the company's original investment in all of its properties. Wright, in valuing the company's properties, included 40,000 acres of land for which the company paid $3,000,000, but which never was put to use in supplying the city with water. The original investment of the company, as shown by the city's witnesses before master Wright, Searls contended, in properties actually in use, does not exceed $22,000,000. On the question of law alone, Searls argued, and not considering the numerous instances where the master overruled witnesses on questions of fact, at least $10,000,000 should be taken off Wright's total valuation of the company's properties. This amount, Searls asserted, includes: "The value of 2,000 acres of land at Lake Merced. The value of 38,000 acres in Alameda county not required to supply the city with water. Two million dollars' enhancement in value of water rights, which the city contends never took place. Separate allowance for "going concern" value of $3,400,000, which Searls contended should have been excluded as a matter of law, and in support of which he cited numerous authorities. More than $2,000,000 as special value of reservoir sites, which the city contends do not exist. More than $800,000 for excess allowance for overhead charges given by the master upon the assumption that the engineering charges on Spring Valley work would be the same as on the New York-Catskill project." Searls further argued and cited as an authority the decision of federal judge Farrington in the last Spring Valley cases in 1903 that the minimum non-confiscatory rate should be placed at five per cent instead of at 7 per cent, as fixed by Wright. The company attorneys took exception to the city's position in the matter of even considering the original investment of the company in determining the present value of the company's properties. Exception was also taken to the refusal of the city to allow special value for reservoir lands, which Wright fixed at $1,200 an acre and which the city showed to have cost but little more than $200 an acre. Allowing for increased value the city's witnesses during the hearing before Wright appraised the reservoir lands at $320 an acre. The Spring Valley attorneys attacked the position of the city in the inclusion of water rights at original cost in the absence of a showing of any appreciation since they were acquired. The principal issue appeared to be over the right of the company to value its reservoir lands for water supply purposes, its watershed lands for residential purposes and its structures

at reproduction cost, and then to add to the total the value of water rights, which ownership of the lands and structures made it possible for the company to use in furnishing water to the city. The city's contention was that only riparian rights which the company had purchased from other land owners below the main diversion dams should be valued because the company would be required to purchase nothing further in order to affect its water deliveries. The attorneys also dwelt upon the risk run by the company through governmental control of its rates, and reviewed the evidence of its witnesses in support of a seven per cent return on its investment. In replying to this portion of the argument Searls showed that the seven per cent rate of return was supported entirely by expert testimony, given by bankers and brokers, and that the cost of money in the past was in practically every case less than six per cent and in most cases did not exceed five per cent. "If the master's report is confirmed by the court and fifty per cent added to the original investment, why should the Spring Valley Water company worry over the risk of governmental regulation?" asked Searls. Trial of the cases before master Wright consumed 152 days and 11,000 pages of testimony. Seventy-five witnesses were called and 235 exhibits introduced. Failure to obtain an order reversing the master's report will mean that the city will carry its fight to higher courts.

STREET LIGHTING AND POWER

Decides Against Zoning City for Gas Rates.

Los Angeles, Cal.—Los Angeles scored a victory in the gas rate fight when the state railroad commission granted the request of both Los Angeles and Pasadena that each be considered a complete zone or district for the purpose of fixing rates for gas furnished by the Los Angeles Gas and Electric corporation and the Southern California Gas company. Both Los Angeles and Pasadena objected to the division of their territory into different zones, and asked that a flat rate be established for each city. The railroad commission had fixed a base rate of 68 cents for the central part of Los Angeles in its original ruling, but other sections ranged as high as 85 cents. This decision, according to city attorney Stephens, the commission has now reconsidered. City attorney Stephens declared his opinion that the 68-cent rate should be fixed for all Los Angeles proper, and that this could be urged later, if the commission does not make an immediate ruling. The rate at present is 68 cents, and Stephens said he did not think it should be changed until the natural gas rates are fixed. Pasadena was given a base rate of 75 cents for most of its territory in the first rate ruling of the railroad commission, and 80 cents in the balance. A flat rate of 75 cents for all Pasadena is believed to be indicated by the commission's new ruling.

Allow Increased Gas Rates.

Morgantown, W. Va.—The state public service commission has allowed an increase in gas rates in this city and vicinity to the West Virginia Traction and Electric Company which is engaged in gas, electric, street car and water service principally in Morgantown and Wheeling. The rates previously in effect were: Domestic consumers, per 1000 cubic feet, 20 cents; commercial consumers, under five million cubic feet per month, 20 cents; between five and 10 million cubic feet, 12 cents; over 10 million cubic feet, 10 cents. The new rates requested for both domestic and industrial consumers were: For the first 250,000 cubic feet per month, 25 cents; for the next 250,000 cubic feet, 20 cents; for the next 250,000 cubic feet, 17 cents; all over 750,000 cubic feet, 15 cents. The rates authorized to be put into effect, deemed by the commission "to be just and reasonable," are: For the first million cubic feet, 20 cents; for the next million cubic feet, 18 cents; for the next three million cubic feet, 16 cents; for all over five million cubic feet, 13 cents. After considering valuations of the property of the company made by engineers for both sides, the aggregate was placed at $853,914.38. "The applicant is entitled," decided the commission, "to receive a rate sufficient on this value as fixed by the commission to provide for depreciation, pay the costs and expenses of operation and repairs, taxes, and a fair rate of interest. Taking into consideration the amount of reserve territory owned by applicant and the probable value of its property when all of its territory shall have been completely developed, it is the opinion of the commission that an annual fund of eight per cent, or $62,840, is amply sufficient as a depreciation charge.

"The operating expenses of said company for 1914 was $51,059.59, for 1915 $15,967.12 and for 1916 $16,513.18, and it is claimed by applicant, and not seriously objected to by protestants, that it should be allowed the sum of $120,000 annually for operating expenses, repairs and taxes. This sum would appear excessive were it not for the abnormally high cost of labor and supplies, but under existing conditions the demands may be justifiable and said sum is accordingly allowed.

"A net return of eight per cent on the value of applicant's property, or $62,840, to the stockholders and owners of same is believed to be a fair and reasonable return, and is the same rate that has been allowed by the commission in similar cases.'

"This makes a total annual revenue of $291,480, which the company is entitled to collect from its consumers of gas. The total amount collected by it under the present rates in 1916 was $252,495.23. It is apparent that the present rates will not yield sufficient revenue to insure the company a reasonable return on the fair value of its property. Is the company entitled to the rates that it seeks to put in force? The large industrial consumers are not paying a high enough rate in comparison with that paid by the domestic consumers, and if it is possible for the company to make up the deficiency without their rates unreasonably high, it should be done without laying additional burdens on the domestic consumers. We believe that a sufficient increase in the return to the company may be had without increasing the rates to domestic consumers, and without granting all the increase requested from the industrial consumers.

"It might be noted here," said the decision, "that some of the largest industrial consumers of gas in Morgantown appeared at the hearings and stated that in their opinion the company was entitled to the increase requested by it."

New Contract for Street Lighting.

Pittsburgh, Pa.—The councilmanic finance committee has affirmed an ordinance for a contract with the Duquesne Light Company for electric street lighting for the first twenty wards of the city. It is for a term of 10 years, beginning January 1, 1917. Light for this year under it will cost the city $333,790. The cost under the old contract was $355,000 yearly, it is reported. The new contract, according to superintendent W. A. Donkin, who appeared before the committee, was based on $1.25 a ton coal and normal prices of labor and materials as prevailed in this city two years ago. He stated that the city will get better service under the new contract, it specifying that the light company furnish 500 better service lamps within six months, and 3,000 better service lamps, all that the city uses, within three years. He said that, if the materials can be got by the light company, better service lamps will be installed in all the twenty wards as soon as possible.

FIRE AND POLICE

City Lacks Apparatus to Fight Big Fire.

Jersey Shore, Pa.—Thirty-five families were made homeless and ten business establishments wiped out by a fire that swept the business section of Jersey Shore, causing a loss estimated at $500,000. With the temperature at zero and the ground covered with a foot of snow that a forty-mile wind piled in great drifts more than 100 persons were forced to flee from their homes, many of them clad only in their nightclothes. Lee Umstead, a fireman, was badly hurt in a fall from a ladder while fighting the flames. The fire, which started in a department store, was discovered shortly after four o'clock in the morning. It had evidently been burning for some time and had gained considerable headway. The town's volunteer fire company fought heroically to confine the flames to the building, but the fire-fighting apparatus proved inadequate, and the blaze was soon beyond control. The fire spread and then jumped across the street and swept both sides. Most of the business blocks burned were three-story brick structures, the upper floors being occupied by offices and as apartments. It was eight hours after the fire was dis-

covered before it was under control. When the Jersey Shore firemen realized that the blaze was getting beyond their power appeals were sent to the Williamsport and Lockhaven fire departments for assistance. One of the Williamsport department's big motor trucks was started for Jersey Shore, but after covering about a third of the distance was unable to force a way through the snow-drifts, which at places were eight feet deep. The apparatus was run back to the city and loaded on New York Central cars, but as the second start was about to be made word was received that the assistance was not needed. Lock Haven succeeded in getting a part of its apparatus, with a number of firemen, through, but one engine became stalled in the drifts. The council was bitterly censured by the people of the town because of its failure to provide funds for the purchase of modern fire-fighting apparatus for the volunteer company. About a year ago the town suffered a heavy fire loss when several buildings in the business section burned. Immediately after agitation was started for modern fire apparatus and has been kept up ever since, but it was claimed sufficient funds were not available. The estimated cost of the apparatus needed was $11,000.

Firemen Dismissed for Refusal to Continue Work.

Fresno, Cal.—Two members of the fire department were summarily dismissed by chief W. C. Berkholtz upon their refusal to continue work on the California Products Company fire. This stubborn fire had been burning for three weeks, and the chief believed that it would be extinguished within a few days.

Blame Firemen Shortage for Lodging House Deaths.

Paterson, N. J.—Lack of a sufficient number of firemen to raise ladders to the third floor of the Rescue Mission was responsible for the nineteen deaths in the fire which destroyed the building last month, according to a presentment returned by the grand jury to supreme court justice James F. Minturn. The fire department officials and officers of the Rescue Mission home are censured. The presentment stated the building was not properly constructed; there was a lack of fire escapes and not proper care taken to warn the inmates in case of emergency.

Fire Prevention Code for Ohio.

Columbus, O.—A comprehensive fire prevention code for the protection of the workshops and factories of Ohio is to be drafted and its requirements enforced by the state industrial commission. A fire prevention committee to draft the code has been appointed by the general safety advisory committee to the industrial commission, a committee representing the Ohio Manufacturers' Association and the Ohio Federation of Labor. The advisory committee also has named another important related committee, on electrical safety. The fire prevention committee will study fire hazards in the workshops and prepare the safety standards which will constitute the code. State fire marshal T. A. Fleming will work with the committee and his department will co-operate in this new work of the industrial commission.

Regulation of Poolrooms Approved by Voters.

Columbus, O.—As a result of the recent referendum election the so-called billiard and poolroom ordinance is now fully effective. Such places are now all closed on Sunday. According to the regulations "no person, society, club, firm or corporation shall open, conduct, maintain or operate a billiard room unless such persons shall have first been duly licensed by the city for such purpose and shall have obtained a permit therefor; provided, however, that such provisions shall not apply to private residences." Those desiring to open or maintain a billiard room must make application to the city auditor for a permit. No license will be granted to a person who is not a citizen of the United States.

The city auditor shall cause an investigation to be made by the director of public safety as to the character and fitness of the applicant or applicants.

The director of public safety and the chief of police shall detail police officers, whose duty it shall be to obtain information pertaining to all applicants. Such patrolmen so detailed shall furnish such information in writing to the chief of police, who shall transmit the same to the director of public safety.

Every person, society, club, firm or corporation to whom a license is granted shall pay an annual fee therefor in the sum of $10.00 for the first table and $5.00 for each additional table, provided, however, that where the applicant is a society or club not organized for profit, no license fee shall be charged for the use of any table or tables. All moneys received by the way of license fees shall be paid into the general fund of the city.

All licenses granted shall expire one year from date of issue.

It shall be unlawful for any person, society, club, firm or corporation to operate a billiard room between the hours of 12 o'clock midnight and 5 o'clock a. m., on any except Sunday, and between the hours of 12 o'clock midnight on Saturday night and 5 o'clock a. m. Monday, or to harbor or permit any person or persons to be or remain in any such billiard room any day of the week between the hours of 12 o'clock midnight and 5 o'clock a. m.

Factory Fire Loss Blamed on Insufficient Water.

Punxsutawney, Pa.—The bursting of a tank and inadequate water pressure resulted in a $200,000 blaze, which destroyed a big window glass factory here. A dozen railway cars were lost in the flames. The fire started when a block in the tank wall was forced out and the melted glass, like a stream of molten lava, poured out on the floor and over the runway into the flattening house. Employees of the company immediately rushed to the fire hose, which is connected to standpipes throughout the plant, to combat the flames, but, according to their statements, there wasn't enough water to throw a stream a distance of twelve feet. In the meantime alarms were turned in, but by the time the fire bell started to ring the wooden structure was a mass of flames. When the pumping engine was attached to the plug near the plant it was discovered that there was not enough water in the line to throw a stream of water to the roof of a fifteen-foot building, according to fire chief Boney's statements. The local water company officials claimed, however, that the pressure was at least 40 to 65 pounds and was adequate. The citizens have been protesting for some time past.

Army Takes Over New York's "Bomb Squad."

New York, N. Y.—The famous "bomb squad" of the New York police department, which, under the command of inspector Thomas Tunney, has won for itself a national reputation in bringing to justice plotters and spies, has been taken over by the war department, and inspector Tunney and the other officers of the squad have received commissions in the regular army, while the non-commissioned personnel will enlist as soldiers of the United States. In addition to the members of the squad, a score or more of central office detectives, who have been, by special assignment, under inspector Tunney's orders, have also enlisted. The entire squad will be assigned to duty with the army intelligence service in the New York district. The difference in pay received by the men from the government and that which they now receive will be made up by the city under the Fenner law, passed by the last Legislature. The new step taken by the government was characterized by federal officials as of far-reaching importance. Two of the deputy police commissioners of New York—Fuller Potter and Henry J. Case—resigned recently, and both are now in the federal service.

Big Blaze in Business Section.

Attleboro, Mass.—Fire, which started from an unknown origin in a store basement, completely destroyed the block and the one adjoining and a number of other buildings, with a loss of at least $300,000. The fire was the worst the city has experienced since 1898. Despite the fact that so much damage was done and the blaze was dangerous, there was no loss of life. One block was in great danger and was saved only by the persistent efforts of the firemen in maintaining a fire curtain. All the city offices are located in this block. Sparks from the blaze set fire to seventeen dwelling houses, which were rescued by volunteer groups. Mayor Harold E. Sweet was on the scene, and he and chief Packard and ex-chief Edward A. Sweeney saw that outside help was necessary. The departments in North Attleboro, Taunton, Central Falls, Pawtucket and Providence were asked for aid. In eighteen minutes after he received the call Taunton's chief was in Attleboro, and

in thirty-three minutes the big Taunton engine was on the scene. This engine did excellent service. The Providence engine also backed to the river, pumping from the opposite bank. North Attleboro, Central Falls and Pawtucket all rendered valuable assistance. The city will buy a new triple combination like that of Taunton.

GOVERNMENT AND FINANCE

Mayor Wins in Recall Election.

Oakland, Cal.—In a sweeping victory that carried every precinct but nine out of 241 mayor John L. Davie of Oakland was returned winner in the recall election that sought his removal from office. The recall was defeated by a vote of 23,176 to 9,161. Mayor Davie received 20,859 votes, while the aggregate vote of his three oponents was less than 10,000. The total vote cast was estimated at 32,850, a little more than one-third of the city's registration of 89,000. The mayor's home precinct was among the nine he failed to carry. The recall was invoked because of disapproval by a few of the mayor's plans for the development of the waterfront for the benefit of the city.

Mayor Asks Citizens to Fill Appointive Offices.

Elkhart, Ind.—W. H. Foster, mayor-elect, upset all local precedents when he permitted a meeting of thirty-five citizens, including members of both parties, to vote on the appointees he announced. He had invited 150 men to the conference, but had not indicated he intended to leave each selection to a majority vote, and therefore many failed to attend.

Salary Increases for Employees.

Astoria, Ore.—The city council has granted an increase of 10 per cent to all city employees who had asked for raises. The employees affected are the police, street workers and the city physician.

Mansfield, O.—Adopting the report of its special committee and approving in detail the increases in compensation to be given employees of the city, the city council has passed amendments to existing salary ordinances, with the result that wages now paid by the city come nearer to ranking with those paid by private concerns for like service. The following are the officers and places on the city payroll that are given increases with the passage of the new ordinance:

Position.	Present.	Future.
City Hall Janitor	$900	$960
Supt. Sanitary Plant	1,080	1,260
Asst. Eng. Sanitary Plant	840	960
Supt. of Parks	900	1,032
Park Police	780	900
Asst. Park Police	720	840
Inspectors of Sewers	960	1,020
Supt. of Streets	1,020	1,080
Service Repairmen	900	960
Laborers	2.40 day	3.00
Street Sweepers	2.15 day	3.00

These increases are directly in line with the recommendations that have been made to the council during several months by service director Hursh and mayor Lowrey, while increases recently granted police and firemen had been sanctioned and urged by safety director Hughes.

Purchasing Agent Makes Saving.

Davenport, Ia.—That $5,450.57 has been saved for the city of Davenport from January 1 to October 1 is shown in a report submitted by purchasing agent F. W. Friedholdt to the city council and mayor. The report says: "These savings are based on various standing contracts made by this department, which were entered into after a careful study of market conditions, and in anticipation of a steady rise in price of various materials required during the year. These contracts were entered into very early in the year and protected the city against a steady increase in price on materials required during the entire year. By the concentration of the buying for the various departments this office was in a position to make uniform the kind of material and supplies required, which at once placed the city on the wholesale list and secured for us wholesale prices. A substantial saving was made by this method. This saving is based on purchases amounting to $42,799.19, or 12 per cent. You will note the actual savings in buying made during the past nine months was $4,239.31, or $471.02 per month. Discounting bills netted us $164.80. A careful audit of all bills and keeping a businesslike record of all accounts saved an additional $1,046.46, making a grand total savings of $5,450.57, or $605.60 per month. The consolidation of the work of the clerk of the board of public works and purchasing agent means a savings of $1,200 a year in the salaries appropriation. The above report is self-explanatory and plainly shows no mistake was made in combining the two offices, the work being carried on without friction and satisfactory to all the city departments and parties concerned, and without the hiring of any extra help. Among the articles purchased on which saving was made were: automobile tires, accessories, fuel and oil; coal, cement, sand, asphalt and stone; hay, oats and corn; horseshoe supplies; printing; office equipment; police coats and badges; lamps; vitrified sewer pipe, catch basin grates, etc."

TRAFFIC AND TRANSPORTATION

State Commission Has Power to Raise Rates.

Albany, N. Y.—The existence of old laws or local franchises setting maximum taxes does not restrict the state public service commission from increasing such fares in case of necessity. This is in effect the decision of the state commission for the Second District in one of the six-cent fare cases, that of the Huntington railroad, which runs between Huntington Harbor and Amityville, Long Island. By reason of the fact that it presented clearly two questions, one of which is common to nearly all of the street railroad applications and the other to a very large number of them, all the street railroad corporations and all the cities, towns, villages and other municipalities interested adversely were notified of the hearing, and so far as they desired were heard upon all of the legal questions involved. There was no dispute that the Huntington Railroad company required increased revenue in order to enable it to pay its operating expenses. It is reported that no community through which it runs either by its board or council objected to the applicants' case on the facts nor did any of the inhabitants thereof or any of the patrons of the road. The two questions presented were: 1. Whether section 181 of the railroad law, which limits a fare for a continuous ride within any city or village to five cents, precludes the commission from authorizing a six-cent fare. 2. Whether the acceptance by a street railroad corporation of a franchise containing a five-cent fare condition precludes the commission from increasing such fare from five to six or more cents for one continuous ride in the same city or municipality. The commission decided that subdivision 1 of section 49 of the public service commission law was intended by the legislature to vest power in the commission, and has made it the duty of the commission, where it finds upon a sufficient showing that in fact the maximum rates or fares chargeable either under section 181 of the railroad law or under the local franchise are insufficient to yield reasonable compensation for the service rendered, and are for that reason unjust and unreasonable, to authorize the increase of such fares. The principal opinion is by commissioner Carr, who cites all of the decisions and all of the statutes of the state of New York having any bearing, historical or otherwise, upon the question. There are concurring opinions by each of the other commissioners. A summary statement of the decision is that the commission has followed the court of appeals in the Ulster & Delaware case (218 N. Y. 643), and the appellate division for the third department in the New York & North Shore case (175 app. div. 869). After authorizing the advance of the Huntington company's fares from five to six cents the commission order concludes: "This determination and order may be reopened at any time if and when it may appear to the commission that the controlling reasons for allowing an increase of

fares in excess of those which otherwise would legally obtain no longer exists." Commissioner Carr quotes the sections of the public service commission law and enumerates the powers of the commission in the regulation of street railway lines and service. He then says:

"What was the purpose of these sections giving such drastic powers to the commission and authorizing it to place burdens on the electric railways, unless the commission was at the same time authorized to give such relief in the way of increased fares as might be necessary to enable the corporation to receive a fair return on the increased investment made necessary by the orders of the commission? It cannot be successfully urged that the commission has the right to order such improvement in service and equipment as might be necessary for the safety of the traveling public, even though this action on its part might in effect operate to confiscate the property of the corporation, for this is contrary to the law of the land. What then does the law contemplate in this respect? The answer is that the commission is empowered to require the corporation to give proper service, and, on the other hand, to require the public to pay reasonable rates for such service. The law as it exists at the present time requires the commission to determine the just and reasonable rates which will enable electric railways to earn a reasonable return upon the value of the property actually employed in the public service and to provide a reserve for surplus and contingencies. So we believe it may be said to be settled that the legislature has full power to delegate rate-making powers to the public service commission and that the commission has full power to fix just and reasonable rates for carriers and public service corporations and that the fixing of rates is a proper exercise of the police power of the state."

It might be claimed, says the commissioner, that because section 181 of the railroad law does not specifically provide for an increase in the rate of fare, therefore the only power of the legislature or the commission is to reduce that rate. On this point he remarked:

"We think that such a decision would be quite untenable because it would be equivalent to saying that the legislature is powerless to amend a general law no matter what the necessity might be or how important for the welfare of the public. While we believe that the use of the word 'regulate' implies an increase as well as a reduction in fare, yet it may be that when the word was first used by the legislature it was intended to mean any revision of the fares charged by electric railways and that the word 'reduce' was used to apply to rates charged by electric railways in excess of 5 cents pursuant to special acts of the legislature, but in any event it is entirely inconsistent with the public service commission law to attempt to hold that the only power given the commission is to reduce fares when the statute particularly imposes upon it the duty to determine the just and reasonable rates which are necessary in order to provide a reasonable return upon the value of the property employed in the public service."

On the other basic question, involving the control of local franchises over fares, commissioner Carr says: "It is settled beyond question that municipalities have no right to impose conditions in franchises other than those which the statute gives them the power to exact. The fact that conditions restricting the fare within the municipality are imposed in a franchise does not deprive the legislature of the supreme power to determine what conditions shall be imposed upon an electric railway corporation. There is no decision in any of the courts in this state which attempts to hold that the legislature in the enactment of general laws governing the creation and operation of railroads, whether electric surface or otherwise, has in any respect conferred upon the municipalities the power to fix a rate of fare in a specific amount. It has delegated the power at different times to fix maximum rates, but this was always subject to the right of the legislature to intervene and revise and alter such rates as might be fixed under the delegated power.

Cost of San Francisco Car Strike.

San Francisco, Cal.—The first six weeks of the street car strike in this city cost the United Railroads approximately $1,231,853, according to an estimate based upon the report of the financial condition of the traction company submitted to the supervisors by the state railway commission. In its request for the financial report the board of supervisors referred to the fact that president Lilienthal of the United Railways had stated that his company was unable to accede to the demands of the striking carmen for a wage increase because the income of the company was not sufficient to justify it. The supervisors stated further that they desired to ascertain whether the refusal of the company to arbitrate or to grant the demands of its employees was justified on financial grounds. The railroad commission, in a letter to the supervisors, announcing that its jurisdiction does not permit it to "ascertain whether the company's position is justifiable," and it simply submits a detailed report of the company's financial condition, without any comment beyond a brief introduction. The report shows that the operating statement of the United Railroads for the month of July of this year gave a profit of $171,468.39, while the operating statement for the month of August, which embraced the first two weeks of the strike, showed a deficit of $239,149.45. The first two weeks of the strike, therefore, cost the traction company just $410,617, or $205,308 a week. Taking this loss as a basis, the estimated loss for the first six weeks is arrived at, as shown above. The total wages paid by the United Railroads to its platform men in the year 1916 amounted to $1,682,525. It is therefore conservatively estimated that the cost of the strike during the first ten weeks was considerably more than a whole year's wages for all of its platform men. While the strike was at its height the company was incurring a loss of nearly a million dollars a month rather than grant a wage increase which would have amounted to only slightly more than three-quarters of a million dollars a year. The operating expenses of the company jumped from $417,285 in July to $615,060 for August. This means that in the first two weeks of the strike the company had to make an extraordinary outlay of $197,775 over and above its operating cost. This sum presumably was spent for the importation and arming of strikebreakers, and for wage bonuses paid them. The company's passenger revenue for July was $622,282. In August it was $409,429.

The average wage paid by the United Railroads to its platform men in 1916 was 30½ cents an hour. During the first six months of 1916 this average was raised to 32 cents, and in July it was raised to 33 cents. An analysis of the weekly wages received by conductors and motormen of four typical United Railroad lines in 1916, when the company's scale of wages ranged from 25 cents to 35 cents per hour, shows that the weekly earnings of the men ranged from $14.10 to $22.90. In June of this year the maximum wage was raised to 36 cents an hour, and in July to 37 cents. According to the report, the salaries of the higher officials make an interesting study. The president of the railroads receives $39,000 a year; the general manager, $25,000; the assistant to the president, $12,000; the secretary, $6,000. The surgeon receives $4,800; the claim agent, $4,200, and the tax agent, $4,800. Three attorneys receive $11,000, $10,000 and $3,600, respectively, while, on the other hand, the chief engineer's salary is $3,900; the master mechanic's is $4,200, and the chief electrician's is $2,700, and that of the purchasing agent is $2,400. In addition to the three attorneys mentioned, fifteen other employees of the law department of the company receive an aggregate wage of $1,335 per month.

The report states that, as it is the practice of the Municipal Railway to pay for the time its men are on duty, regardless of whether they are actually engaged in running or not, while the United Railroads platform men are only paid for the actual running time of their cars and receive nothing for the time they are waiting at the car houses for runs, it is impossible to determine what the exact increased cost would be to the United Railroads if the municipal wage schedule of $3.50 for eight hours—which the strikers are demanding—were applied to its employees.

Valuation of Minneapolis Street Railways.

Minneapolis, Minn.—Following the valuation by city engineer Cappelen last year, another official report has been made on the valuation of the property of the street railway system, which is controlled by the Twin City Rapid Transit Company. The new valuation is by James D. Hogarth of the city attorney's office at Milwaukee, who was retained by mayor Thomas Van Lear. The new estimate is less than that made by the city engineer, although it is based upon the Cappelen analysis and gives the same value for real estate. Some of the comparisons are as follows:

	Cappelen.	Hogarth.
Rolling stock	$4,649,318	$4,066,950
Real estate	1,088,862	1,088,862
Tracks	2,743,564	2,232,337
Bridges	126,427	112,256
Total valuation	16,205,638	13,608,730

The reports differ more in their estimate of depreciation. In the case of one line of road the city engineer estimated the cost to reproduce at $89,629, figured the depreciation at $1,141 and left the true valuation at $88,475. Mr. Hogarth contended that if labor depreciation was allowed also the section would be valued at $70,555. Mr. Hogarth said new cars could be reproduced at $6,000 or less, and he made a 10 per cent depreciation deduction and a further deduction of $400 a car for pay-as-you-enter equipment, which he said are necessary to permit economical operation.

NEWS OF THE SOCIETIES

Calendar of Meetings.

Dec. 26-29.—AMERICAN POLITICAL SCIENCE ASSOCIATION. Annual meeting, Philadelphia, Pa. Secretary, Clinton J. Swartz, Trenton, N. J.

Dec. 27-29.—AMERICAN SOCIOLOGICAL SOCIETY. Annual meeting, Philadelphia, Pa. Secretary, Scott E. W. Bedford University of Chicago, Chicago, Ill.

Jan. 3, 4.—NEW JERSEY STATE LEAGUE OF MUNICIPALITIES. Annual convention, Trenton, N. J. Secretary, Clinton A. Swartz, Trenton, N. J.

Jan. 15-17.—VIRGINIA GOOD ROADS ASSOCIATION. Seventh annual convention, Richmond, Va. Secretary, C. B. Scott, Richmond, Va.

Feb. 6-13.—FIRST CHICAGO CEMENT MACHINERY AND BUILDING SHOW. Supersedes annual Chicago Cement Show. Held at the Coliseum, under direction of the National Exhibition Co.

March 17-24.—PAN-AMERICAN CONGRESS ON CHILD WELFARE, Montevideo, Uruguay. Secretary, Edward N. Clopper, 105 East 22d Street, New York, N. Y.

Public Ownership League.

A Public Ownership Conference under the auspices of the Public Ownership League of America was held November 25 to 27 at the Hotel La Salle, Chicago, and drew a large number of well-known speakers on all phases of this subject.

On Sunday morning the president, A. M. Todd, delivered his address on "Municipal and Public Ownership in Europe." The program follows: Prof. Charles Zueblin, "The Public Ownership of Railroads"; Louis F. Post, "The Public Ownership of Land"; Gifford Pinchot, "The Conservation of Natural Resources"; Henry H. Klein, "Proper Methods of Financing the Acquisition."

At the afternoon session the following papers were presented: Harry Laidler, New York, "A Survey of Public Ownership Throughout the World." Dr. Delos F. Wilcox, "Financial and Administrative Preparation for Municipal Ownership." J. W. Brown, of the National Executive Committee of the United Mine Workers of America, "Why Organized Labor is for Public Ownership." Samuel R. Maxwell, organizer for the National Nonpartisan League, "The Farmer's Interest in Public Ownership." Henry M. Ashton, Chicago, "The Municipal Ownership Movement in Chicago." Dr. M. G. Lloyd, associate electrical engineer, Dept. of Commerce, Bureau of Standards, "Standards for Electric and Gas Service."

In the evening papers were read as follows: E. W. Bemis, Chicago, "From Regulation to Public Ownership." Carl S. Vrooman, assistant secretary of agriculture, "Public Ownership of Railways." William English Walling, "Public Ownership and Internationalism"—a survey of public ownership throughout the world. James B. Balch, mayor of Kalamazoo, Mich., "Municipal Fuel Yards." J. G. Glasgow, manager, Winnipeg municipal light and power department, "Municipal Ownership in Winnipeg."

The Monday morning session featured the following speakers: Benjamin C. Marsh, New York, "Proper Methods of Financing the Acquisition of Public Utilities." J. Weller Long, secretary, American Society of Equity, "Why the Farmer Need Public Ownership." R. B. Howell, commissioner of public works, Omaha, Neb., "Municipal Water Works." R. F. Pettigrew, "The Fight for National Forests." Charles H. Ingersoll, New York, "The High Cost of Living and How to Meet It." W. J. Hannah, Big Timber, Montana, "Farm Credits for the Common Good."

In the afternoon the following were heard: Louis Wallis, Chicago, "Public Ownership, the Immediate Issue and the Common Ground for Social Reforms." F. W. Ballard, "Cleveland's Electric Light Plant." Edward F. Dunne, "Public Ownership Movements in Illinois." Florence Kelley, "Immediate Steps Toward the Postalization of the Telegraph and Telephone." Anna Maley, Minneapolis, "Public Ownership and the High Cost of Living." O. M. Thomason, lecturer for National Nonpartisan League, "The Public Ownership Movement in the Northwest."

On Monday evening the following spoke: Homer Talbot, secretary, Kansas League of Municipalities, "Municipal Ownership in Kansas and the Southwest." Daniel W. Hoan, mayor of Milwaukee, "The Failure of Regulation." Frank P. Walsh, chairman U. S. Commission on Industrial Relations, "Public Ownership and Industrial Conditions." Thomas H. McCauley, superintendent Municipal Railway, Calgary, Canada, "The Calgary Municipal Railway."

Tuesday morning was devoted to the following speakers and themes: Charles T. Farson, registrar, Cook County, "The Torrens System of Land Title Registration." Charles K. Mohler, secretary Public Ownership Committee, Los Angeles City Club, "Municipal Ownership in the Pacific Coast Cities." Victor L. Berger, editor Milwaukee Leader, "Public Ownership and the High Cost of Living." Walter J. Millard, "Proportional Representation as a Means of Securing Democratic Control." H. D. Flint, Chicago, "The Monorail System of Railways." Hugh Reid, "The Struggle for Municipal Ownership of Street Car Lines in Chicago."

In the afternoon were presented: C. W. Koiner, "The Pasadena Electric Light Plant and the Fight for Municipal Ownership in Southern California." Ray McKaig, state master, North Dakota Grange, "The National Grange and Public Utilities." F. F. Ingram, Detroit, "The Co-ordination of Water with Rail Transportation and a Rational System of Rate-Making." Robert Buck, "The Hydro-Electric Light and Power Plant of Chicago—the Largest Municipal Plant in the States." E. E. Carr, "Public Ownership of Mines." Judson King, "Popular Government Necessary to Public Ownership."

The meetings ended with the following series of papers on Tuesday evening: John C. Kennedy, member, Chi-

(*Continued on page 620.*)

PROBLEMS CITIES ARE STUDYING
WITH EXPERTS

SEWER extensions to cost $100,000 are to be built by Pottstown, Pa. The engineer for the improvement is C. E. Collins.

A SEWERAGE SYSTEM is to be built by Penn Station, Pa., plans for the work having been drawn by the engineer, Louis D. Tracy.

Rosedale, Kan., is to build a TUNNEL and other creek diversion structures. Plans and specifications were the work of the firm of Harrington, Howard & Ash.

In its controversy with the local street railway company regarding CAR FARES and SERVICE, the city of Trenton, N. J., has retained as its expert Peter Witt to make a survey of the company's property.

Before allowing the local traction company to extend its lines, the city of Dallas, Texas, has retained George E. Kessler, landscape engineer, to make a survey and prepare part of a CITY PLAN covering this phase of the city's development.

Prairie City, Ia., is improving its WATERWORKS. The engineer for the city is Lawrence W. Cox.

Newport, Ark., is to make FLOOD PROTECTION improvements. Plans for the work are being prepared by the Morgan Engineering Company.

The WATERWORKS of Guthrie, Okla., will be improved at a cost of about $200,000. Plans are in course of preparation by the Benham Engineering Company.

Reinforced concrete BRIDGES to cost more than $300,000 are to be built by Hehama county, Red Bluff, Cal. The supervisors had plans and specifications for the work prepared by the engineering firm of Weeks & Day.

Johnstown, Pa., has voted $500,000 bonds for the construction of a SANITARY SEWER SYSTEM. The city has retained the consulting engineering firm of Gannett, Seelye & Fleming to prepare plans and specifications for the work.

NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

TURBINE TRACTION GRADER.

Koehring Machine of Big Capacity With New Features.

The Koehring turbine grader is a power-driven machine which moves forward under its own power, cutting the roadbed and elevating and loading the material into trucks or wagons in position alongside. It is built to dig and load from 60 to 100 cubic yards per hour and is said to be replacing from 100 to 125 men on street and road grading jobs for such well-known paving contractors as the American Asphalt Construction Company and the White Paving Company of Chicago. This labor-saving factor is bound to be very important for contractors at present. With labor scarcity and the necessity for time-saving, the big capacity of this machine becomes more and more a source of valuable economy. On large camps removed from labor centers, the reduction in the number of men needed may easily mean obviating the necessity of maintaining a costly construction camp. The Koehring grader requires only one skilled operator and two helpers, one assisting the operator and the other staking the grade and directing the movement of teams.

The digging action is accomplished by a rotating cylinder, on which are mounted twelve buckets. On the cutting edge of these are rooters, which dig out the material, tumbling it back into the buckets which elevate and dump it on the belt conveyor extending at right angles from the sides of the grader in position to discharge the material directly into wagons, trucks or cars. The conveyor may be adjusted to load on either side of the grader.

The cutting wheel is adjustable vertically to make a cut from one inch to two feet deep. Cuts are five feet seven inches wide. While the digging wheel is in action the entire machine moves forward at any of three speeds, according to depth of cut and character of material. The weight of the grader is carried on two sets of multiplanes, which do away with planking and prevent settling. Each multiplane has a contact surface of five feet long and one foot eight inches wide. The pressure on the ground is seventeen pounds per square inch. The operator maintains grade by sighting across properly placed grade stakes and any settling is easily detected and corrected by elevating the cutting turbine. Control is completely centralized in the operator's cab, from which the cutting wheel is raised or lowered and the machine sent forward at its various speeds, or reversed. The traveling speed is one mile per hour. Short turning is accomplished by separate control for each set of multiplanes, enabling one set to "walk around the other," practically turning the machine within its length.

Gas engine power is from 4-cycle, 4-cylinder, vertical 6¼x8-inch engine, rated 45 h. p., and developing 60 h. p. on brake—tubular radiator. Steam power is from Simplex engine, rated 25 h. p., and 30 h. p. boiler.

All construction is for heavy duty. The turbine rack is made of manganese steel segments, driving pinions are of manganese steel; gears and bearings are all of special cast steel; idlers are bronze-bushed; all shafting is extra heavy and all bearings have genuine babbitt.

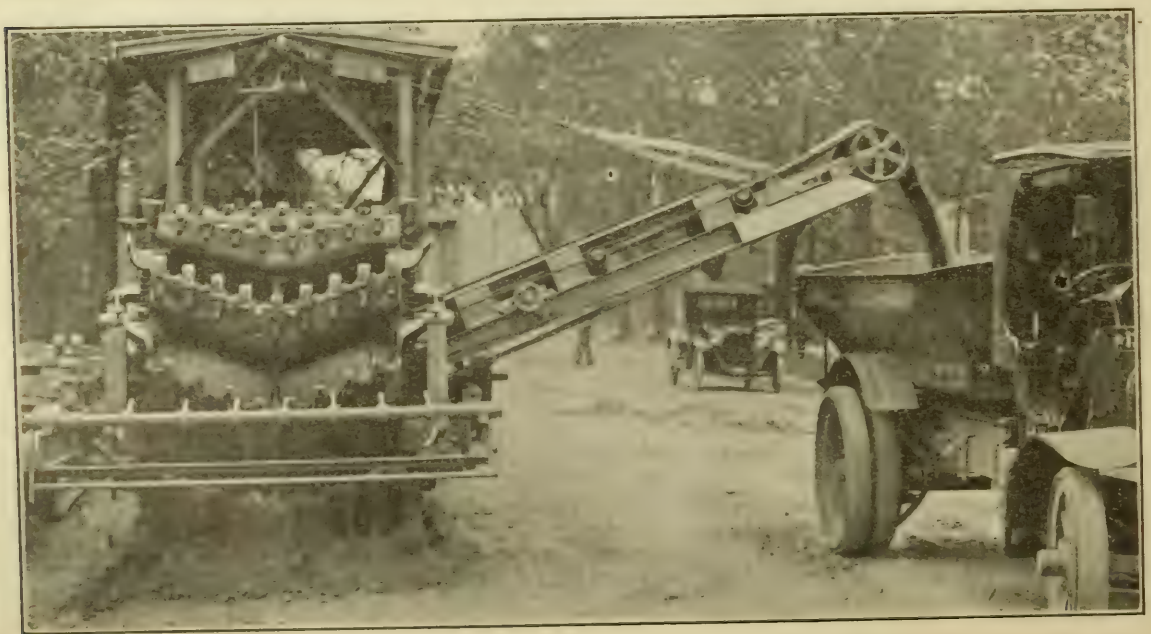
Over-all dimensions are: Height, 11 feet 11 inches; length, 32 feet; width, including conveyor, 17 feet 8 inches; width, with conveyor folded, 10 feet. The weight, with gas engine, is 45,000 pounds.

If desired an automatic screen can be installed inside the cutting wheel for screening old macadam to save stone.

It is claimed that the grader practically standarizes grading costs, since it is equally effective on any kind of work, ripping out and loading macadam or rubbery clay about as easily as gravel dirt. It is calculated that on well-handled jobs a three-cent cost for loading two-yard wagons may be obtained. On material on which hand shovel labor is five wagons per day, the Koehring is claimed to be able to do six hundred wagons or more per day.

The accompanying cut shows a job at Milwaukee, Wis., work done by the White Paving Company, illustrating the adaptibility of this machine for shallow grading. A cut of eight inches was taken from an old waterbound macadam street which had been in service for a number of years. The machine did this with such efficiency that a comparison can hardly be made with any other means for handling this class of grading. On this work the White Paving Company used dump wagons and also motor trucks and even with this shallow grading they succeeded in loading three-ton dump trucks in less than 1½ minutes, at a cost of about four cents per cubic yard for digging and loading the material on the truck.

The machine is made by the Koehring Machine Company, Milwaukee, Wis.



KOEHRING TRACTION GRADER TAKING 8-INCH CUT FROM OLD MACADAM STREET.

FLEXFORM JOINT.

Mold for Poured Joints for Vitrified Clay Pipe.

Good results lately achieved with poured joints of cement grout in the installation of vitrified clay pipe indicate that this method is soon destined to become widely favored in building drain and sewer construction. Much work has been done in an effort not merely to make a better joint, but one in which the possibility of error through inexpert workmanship is reduced to a minimum. The advantages claimed for the poured joint are: Greater uniformity in quality; denser cement when set; more rapid operation; considerable saving in material; less need for working space in trench; neater joint.

Several types of mechanical mold for vitrified pipe joint have been designed and patented. The mold used by the Sewer Pipe Manufacturers' Association in demonstrations is called the "Flexform" and is composed of a series of overlapping sheet metal plates, strung on two steel cables of small diameter. When passed around the joint and clamped, it holds the spigot end of one pipe centered in the bell of another, and holds the grout that is poured into a funnel at the top. During the period of setting it protects the bond of the cement against any shock or strain.

The joint is caulked with oakum, which is properly compacted to form a gasket—and prevent the flow of joint material into the interior of the pipe. The mold is first dipped in oil to prevent grout adhering. It is passed under and around and clamped so that it takes a firm grip on both pipes with enough overlap on the socket to insure even and maximum space for the joint material. It is recommended that sufficient molds be provided for the entire number of joints, or, in the case of large continuous operations, enough for one day's work. Molds are clamped on the entire number before any are poured. A good material consists of one part by volume each of cement and medium sand, mixed dry and then with water to a consistency of thick cream. A little water is first poured into each mold to insure free flow. The grout is poured immediately afterward—enough being used to fill both the mold and the funnel—while a slight leakage acts as a safeguard against air-holes or water obstruction. Molds are left in place for twelve to twenty-four hours to get the initial set. The mold unclamps in such a manner so as to split the funnel or hopper into two parts, leaving a protruding jet of surplus joint material shaped like a funnel. These jets can be removed by stirring the cement in the funnel with a small rod during the setting period.

The accompanying illustrations show the joint being poured, the completed joint and a test. It is recommended that 48 hours be allowed to elapse before water pressure be applied. Lines of pipe joined by this method have repeatedly withstood pressure four or five times that required by specifications. The Flexform is the invention of Dewitt H. Wyatt, 1672 Summit street, Columbus, O.

INDUSTRIAL NEWS

Cast Iron Pipe.—Prices at all points remain the same after the recent rise. Quotations: Chicago, 4-inch, class B and heavier, $58 50; 6-inch, $55.50. New York, 4-inch, class B and heavier, $59.50; 6-inch, $56.50. Birmingham, 4-inch, class B and heavier, $53; 6-inch, $50; class A, $1 extra, all sizes.

Portland Cement Association.

B. F. Affleck, Chicago, was re-elected president of the Portland Cement Association at its annual meeting at the Hotel Biltmore, New York, Dec. 12. Mr. Affleck is president of the Universal Portland Cement Co. F. W. Kelley, president, Helderberg Cement Co., Albany, N. Y., was elected first vice-president, and Richard Hardy, president, Dixie Portland Cement Co., Chattanooga, second vice-president. G. S. Brown, president, Alpha Portland Cement Co., Easton, Pa., was elected treasurer.

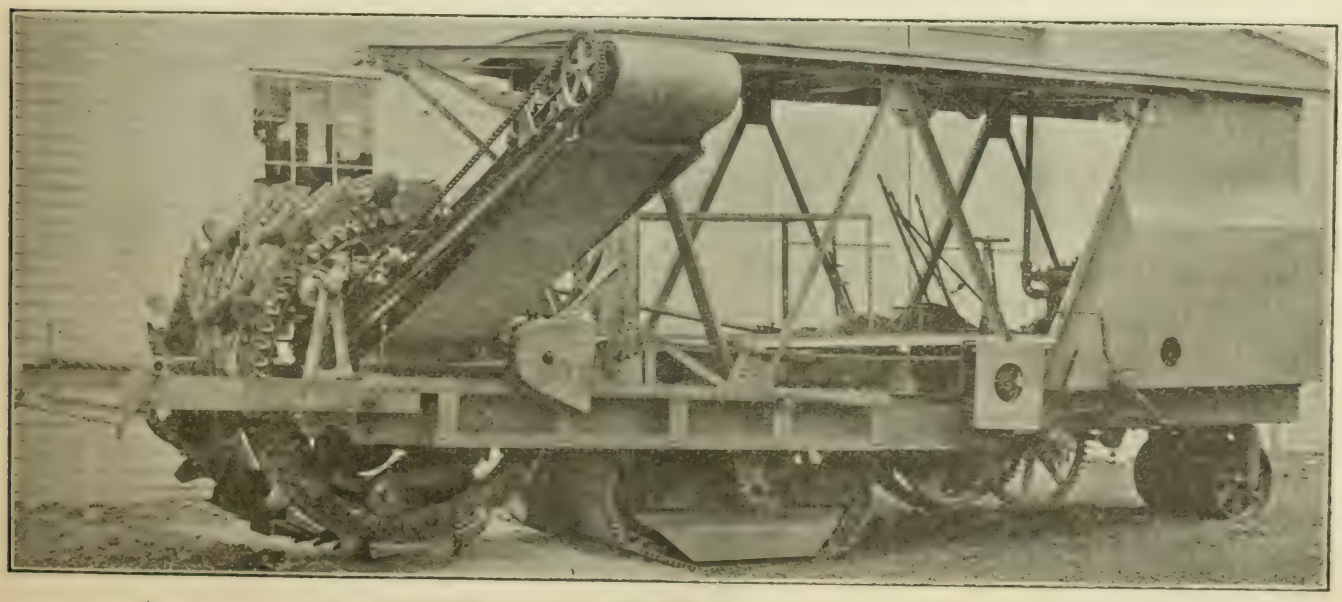
The Portland Cement Association has turned its activities largely to the promotion of permanent roads in line with the desire of the Council of National Defense that through routes be quickly developed to supplement the railways, especially for short-haul traffic.

Walter A. Zelnicker Supply Co., St. Louis, Mo., has issued Bulletin No. 227, announcing a comprehensive list of real bargains in all kinds of contractors' and public works' machinery.

Road Machinery Manufacturers' Association.

At a meeting of road machinery manufacturers held in Chicago December 11, an association was formed for purposes which include "the promotion of friendly relations and the discussion and exchange of ideas for the benefit of its members, and the promotion of good roads." Only manufacturers of road machinery are eligible to membership, and practically every such manufacturer in the country has become a member. The following officers were elected:

President, William T. Beattey, Austin-Western Road Machinery Co., Chicago; vice-president, David B. Cook, Acme Road Machinery Co., Frankfort, N. Y.; secretary-treasurer, M. W. Baker, Baker Manufacturing Co., Springfield, Ill. The board of directors of the association consists of these officers and the following: S. Jones Phillips, American Road Machinery Co., Kennett Square, Pa.; W. R. Adams, J. D. Adams & Co., Indianapolis, Ind.; E. B. Smith, Smith & Sons Manufacturing Co., Kansas City, Mo., and C. O. Wold, Russel Grader Manufacturing Co., Minneapolis, Minn. The affairs of the association will be managed by the board of directors.



KOEHRING TURBINE TRACTION GRADER (SIDE VIEW).

NEWS OF THE SOCIETIES

(Continued from page 617)

cago City Council, "The Chicago Municipal Water Works." David J. Lewis, U. S. Tariff Commission, "The Case for the Postalization of the Telegraph and Telephone." S. J. Konenkamp, international secretary, Commercial Telegraphers, on "Labor's Interest in Postalization." Herbert S. Bigelow, Cincinnati, "The Outlook and Progress of Public Ownership in America."

Fire Marshals' Association of North America.

The recent convention of the marshals held at New Orleans was well attended by about sixty delegates. As this was the first convention following the declaration of war much of the attention of the members was devoted to the prevention of incendiarism by enemy plotters.

Gov. Pleasant welcomed the delegates for Louisiana, and mayor Behrman extended the greetings of the city. President T. L. Hussey, of Topeka, fire marshal of Kansas, delivered the annual address.

The afternoon program included addresses on "Signs of the Times," by C. J. Doyle, of Springfield, Ill.; "Woman's Part in Fire Prevention," by Miss Bessie Street Coburn, of Mississippi; a round table discussion on "Fire Waste vs. the High Cost of Living," by E. M. Gillenwaters, of Tennessee; an address upon "The Problem of Attack," by Franklin H. Wentworth, of Boston, and a round table discussion on "Utilizing Fire Departments for Fire Prevention Work As Well As for Fire Fighting," led by S. W. Inglish, state fire marshal of Texas.

Thursday morning's session was occupied with papers and round table discussions, and in the afternoon the delegates were guests of W. M. Campbell, fire marshal of Louisiana, and his local committee on a boat trip through the harbor.

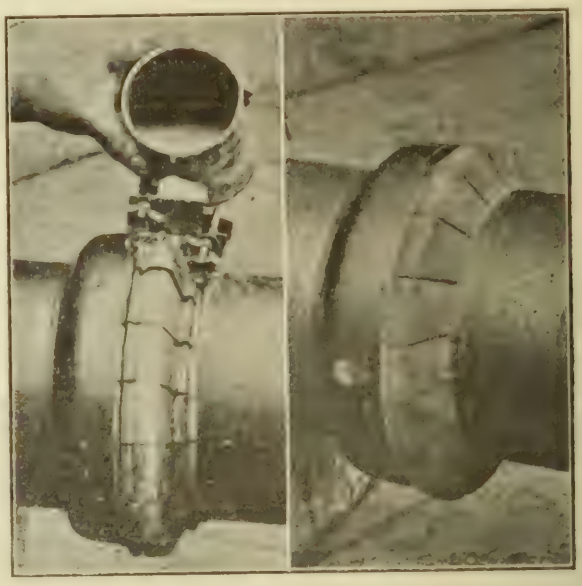
Creation of a permanent federal bureau of fire prevention, nationwide in scope, to co-operate with state and city departments, was advocated by William M. Campbell, Louisiana fire marshal.

The use of paid advertising space, the hitching of fire prevention propaganda to items of special news interest and greater care in writing and issuing publicity matter were advocated as aids to fire prevention, in a paper on "Fire Prevention and the Press," by Imre Zuwalt, deputy state fire marshal of Kansas.

Other papers read Friday morning were: "What Constitutes Evidence in the Prosecution of Arson," by F. R. Morgridge, of the National Board of Fire Underwriters"; "Fire Prevention Possibilities," led by T. Alfred Fleming, state fire marshal of Ohio; "The Value of Uniform System of Statistical Records," led by James R. Young, insurance commissioner of North Carolina; "Co-operation, Efficiency and Preparedness," by H. H. Friedley, state fire marshal of Indiana; "How May We Secure Better and More Efficient Co-operation Between Fire Marshals and Local Fire Chiefs," round table discussion led by S. E. Grans, state fire marshal of South Dakota; "Automatic Sprinklers from the Fire Marshal's Standpoint," by Paul Mason.

Adopting resolutions asking the federal government to empower the National Council of Defense with greater equipment for enforcing fire protection, even to establishing armed guards if need be, the association concluded its convention by the election of the following officers: James R. Young, Raleigh, N. C., president; William M. Campbell, Louisiana, vice-president; John G. Gamber, Illinois, secretary; L. T. Hussey, retiring president, Kansas, and E. P. Heaton, Ontario, members of the executive committee.

The following cities extended invitations for the next annual convention: Indianapolis, Sioux Falls, Portland, Ore.; Columbus, O.; St. Louis, Memphis, New York, and San Francisco. The place of meeting will be decided by the executive committee.

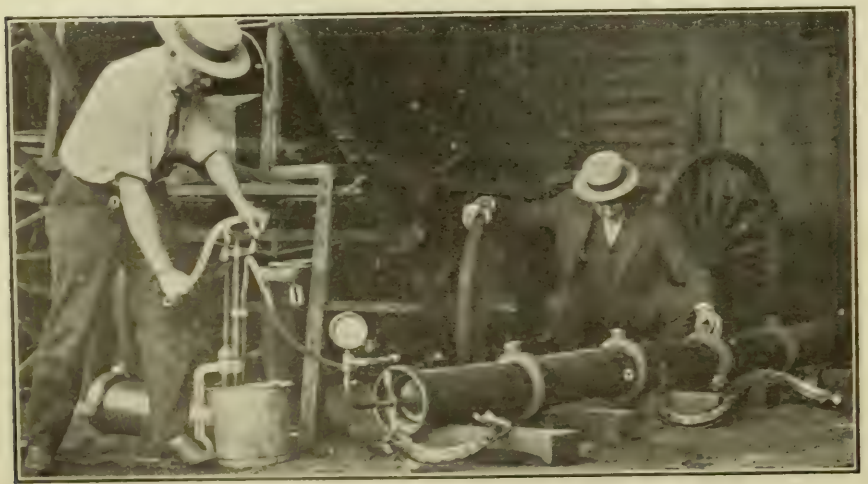


METHOD OF POURING FLEXFORM JOINT IN VITRIFIED CLAY PIPE (SHOWING CONSTRUCTION OF MOLD AND CLAMPS AND APPEARANCE OF FINISHED JOINT).

Illinois Municipal League.

The fourth annual convention of the Illinois Municipal League and the League of Illinois Municipalities was held at the University of Illinois, Urbana-Champaign, December 6 and 7. Mayor William E. Barber, of Joliet, delivered the president's address.

The following papers were read and discussed at the three sessions of the convention: "Municipal Home Rule in Ohio," A. R. Hatton, Cleveland; "Municipal Home Rule in Other States"; "Municipal War Works," Robert E. Cushman, University of Illinois; "Atmospheric Sanitation" (illustrated), Prof. C. S. Sale, University of Illinois; "Garbage Incinerators," Prof. J. E. Smith, University of Illinois; "The Sanitary District Law," James S. Baldwin, Decatur; "Community Morals," Clifford G. Roe, assistant corporation counsel, Chicago; "The City Management Plan for Chicago," George C. Sikes, Chicago bureau of public efficiency; "Municipal Accounting," John B. Tanner, Chicago; "Street Railway Franchises in Illinois," Earl W. Rugg, Monmouth; "The League of California Municipalities," William J. Locke, executive secretary.



TESTING FLEXFORM JOINT IN VITRIFIED CLAY PIPE.

Municipal Journal

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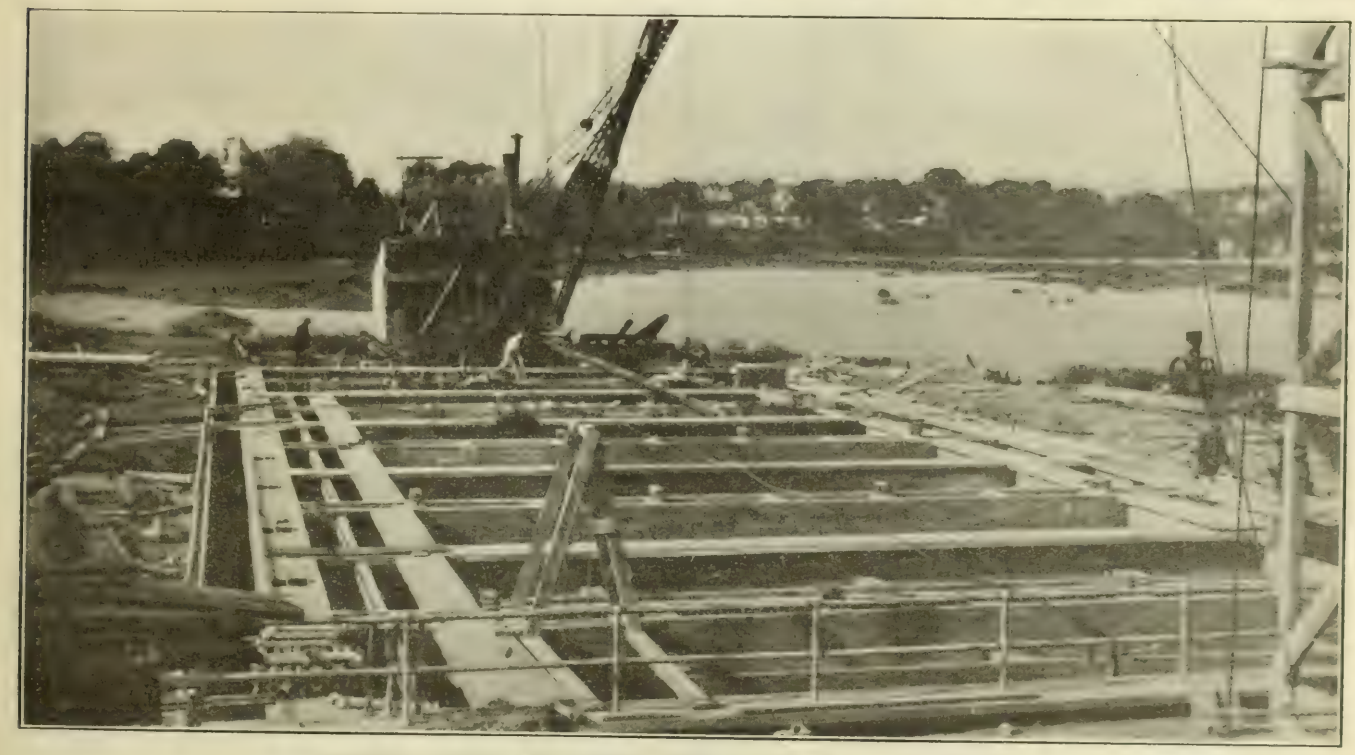
THE GREENWICH SEWAGE TREATMENT PLANT

Located on an Island Opposite the Town—Imhoff Tanks and Chlorine Treatment—Sludge Pumped Onto Sludge Beds—Difficult Construction Owing to Mud and Quicksand Soil.

For many years Greenwich, Conn., has been discharging its sewage into Long Island Sound without any preliminary treatment whatever. There are low areas—mud flats—within the city which are flooded at high tide and the wastes discharged at low tide are carried back with every incoming tide. To prevent nuisance from this source, work was begun about eighteen months ago on a sewage treatment plant which has just been completed. In its construction, the town of Greenwich united with the borough of Greenwich, each bearing a share of the cost.



GENERAL VIEW OF TANKS, EXCAVATOR IN BACKGROUND.
In the background is seen the city, with the channel of water between it and the island on which the plant is located.

The plant, which is located on Grass Island in an arm of the sound, is of the Imhoff type, with ten digestion tanks, each 12 feet wide and 54 feet 4 inches long. The total width of the ten units is 146 feet 8 inches and the tank length over all, 60 feet 8 inches. The arrangement is such that the tanks may be operated singly, in pairs or in larger groups and the design allows for reversal of flow. The tanks have an effective depth of 20½ feet. The upper chambers have vertical side-walls to a depth of 5 feet, below which, to an additional depth of 4.75 feet, the walls slope about 45 degrees. Below the slot, which is 8 inches in width, is a reinforced concrete beam, 18 by 20 inches, triangular in shape. The lower chambers are 7.75 feet deep, the lower 3 feet, comprising the hopper, having a slope of about 1 on 2. Each lower chamber is divided into four of the sludge hoppers, each of which is provided with a 4-inch sludge-discharge pipe. Gas vents are provided for each tank and alternate dividing walls between the tanks carry sludge discharge troughs. The capacity of the upper chamber in each unit is 16,000 gallons and of the lower chamber 56,800 gallons. The plant is designed to care for a flow of 1,000,000 gallons every 24 hours, which is considerably in excess of the present flow.

The sewage is carried to the plant through a section of the old outfall sewer laid across the mud flats, a 24-inch tile line which is partially submerged at low tide and wholly covered at high tide. The remaining section of this line, extending out to the sound, will be used to discharge the tank effluent when the plant is operating.

Except for the application of chlorine, no further treatment will be applied to the tank effluent. Chlorine will be applied by means of apparatus located in the pump-

TROUGHS ALONG IMHOFF TANKS
Inner trough distributes sewage to tanks. Outer trough carries effluent.

house a short distance from the plant, the amount of chlorine used depending on the flow of the effluent.

The sludge will be discharged from the hoppers in the usual way by hydrostatic pressure and carried, by troughs located between each pair of tanks, through a 16-inch cast iron pipe line to the pump well, whence it is pumped to the sludge beds through another cast iron line. The sludge beds are two in number, 40 feet square and 18 inches thick. Four-inch tile drains are laid with open joints in the bottom and are covered with 6 inches of broken stone and 12 inches of sand. The distribution is from a trough, at one end of which is a semicircular apron with a 4-foot radius, over which the emerging sewage flows.

VALVES IN INLET TROUGH GOVERNING FLOW INTO TANKS.

The pumphouse is of brick, 25 feet 4 inches by 33 feet 4 inches. The pump well located under the pump house is 20 feet deep, 10 feet wide and 22 feet long. The walls, which were designed to prevent seepage under a head of 15 feet, are 20 inches thick at the bottom and 16 inches at the top. Gravel concrete was used, with Atlas Portland cement mixed 1:2½:4½, three per cent by weight of Medusa waterproofing being added. A centrifugal pump driven by a 15 h. p. Wagner motor comprises the equipment.

Many difficulties were encountered in construction. The island on which the plant is built is composed of mud, quicksand and a mixture of sand and mud, while the water head on the deepest excavation ranged from 15 to 20 feet, under ordinary conditions, and one high tide flooded the whole job and forced the suspension of work. No right-of-way could be secured for building a road to the island and most of the work was done with men and materials transported in boats and carried over 600 feet of trestle connecting the island with deep water. Aggregate brought in by barges was unloaded by a portable digging unloader and carried by industrial railway to the mixer.

A traveling excavator equipped with a ¾-yd. orange-peel bucket was used on the excavation, practically none of this work being done by hand. Some of the excavated material was dumped a few feet outside the line of excavation as a protection against high water, while the remainder was loaded into industrial cars and dumped to raise the level of the island. The excavator was equipped with a 52-foot steel boom and double-flange wheels. The length of the boom and the weight of the excavated material proved a strain on the excavator and made necessary weighting it to prevent tipping.

Sheeting was necessary on all excavation. Tongue and groove piles of Georgia pine, 4 inches thick, 8 or 10 inches wide and 24 feet long were used. These were driven as the depth of excavation progressed, finally being driven flush with the original surface of the island, leaving only the earth cofferdam for protection against high water. Rangers were 12 by 12 and 12 by 14. Steam hammers, of which there were two on the job, suspended from the boom, drove all piling on most of the work, the hammers being assisted by a jet pipe put down alongside the pile. The sheeting piles were put down 6 feet outside the line of construction.

As might be expected, considerable water was encountered, the amount depending on the height of the tide, but averaging about 1,000 gallons per minute. Three pumps were used, two pulsometers and a centrifugal, all steam operated; occasionally these were supplemented by one or more small gasoline-operated units of the "Domestic" type. To facilitate drainage, a sump 6 feet deep was maintained at one end of the excavation.

Because of the lack of stability of the underlying ground, which was mainly mud and quicksand, it was necessary to line the entire bottom of the excavation for the tanks with 2 by 6-inch timbers supported on piles, this "mat" following in general the shape of the bottom of the tanks. On this the forms were constructed. Under each of the dividing walls between the tanks were driven nine piles, 20 feet long, with 10-inch butts. Under the end walls were driven 13 of the same piles. Occasional high water interfered with this work and at one time floated a pair of tanks that had been built, but without damaging them.

In excavating for the pumphouse, on account of the depth, two tiers of sheet piles were driven, the tiers lapping about four feet. Quicksand proved very troublesome here, pouring up from under and between the piles and causing the collapse of the existing main outfall sewer which was nearby. As in the excavation for the Imhoff plant, a mat had to be constructed on piles, on which, in turn, the forms were constructed. Underneath this mat, tile drains were laid to a sump to keep as firm as possible the earth on which the pumphouse was being built. Pumping at this sump was continued until construction was complete.

All concrete was distribted through a Ransome chute from a 112-ft. tower at one end of the plant. The tower, which was 6 feet square, was guyed by eight cables, in addition to which there was another cable to support the concrete chute. A Foote 1-yard mixer was used; the hoist was operated by a Florey steam engine. Atlas cement was used with gravel, mixed 1:2½:4½. The tanks were poured two at a time, complete, except that the sides and bottoms of the upper or sedimentation chambers were cast outside and put in place afterwards. Hydrated lime was used in all concrete work. Especial care in making the forms and in pouring and finishing the concrete resulted in an unusually neat job. Around

INTERIOR VIEW OF IMHOFF TANK.
Slot in bottom. Note wide gas slots at the sides.

VIEW ACROSS SLUDGE BED, SHOWING INLET AND DISTRIBUTION APRON.

the outside of the Imhoff tanks was constructed a railing of 2-inch galvanized pipe.

Clyde Potts, 30 Church St., New York, was consulting and designing engineer. The work was done by the Suburban Engineering Co., New York City. E. W. Shepherd was field superintendent for the contractors until recently, when Wm. T. Langdon took over the work. Paul Martzell was inspector for the sewer commission, which was composed of Messrs. Frost, Semp and Peck, representing the town of Greenwich; Messrs. Crosby, Drinkwater and Outwater represented the borough of Greenwich.

HOW CITIES MAY OBTAIN WAR INDUSTRIES.

The War Industries Board has recently appointed a representative known as the Industrial Representative of the board, whose duty it is to discuss with representatives of manufacturing plants how best they can secure Government work, either by utilizing their existing facilities or by changing these to meet the requirements of any articles needed by the Government. It is also the duty of this representative to consider the placing of orders in localities not now congested by Government orders, taking into consideration the available supply of labor, power and housing facilities.

If any city official or board of trade or manufacturer thinks that there exists in his city or plant facilities for manufacturing any goods needed by the government, correspondence or a personal interview on the subject will be welcomed by the Industrial Representative of the War Industries Board at its building on the corner of 18th and D streets, Washington, D. C.

ODORS FROM SEWAGE TREATMENT PLANTS

Experiences at a Number of Plants in the United States and Opinions of Sewerage Specialists—Time Required for Septicization.

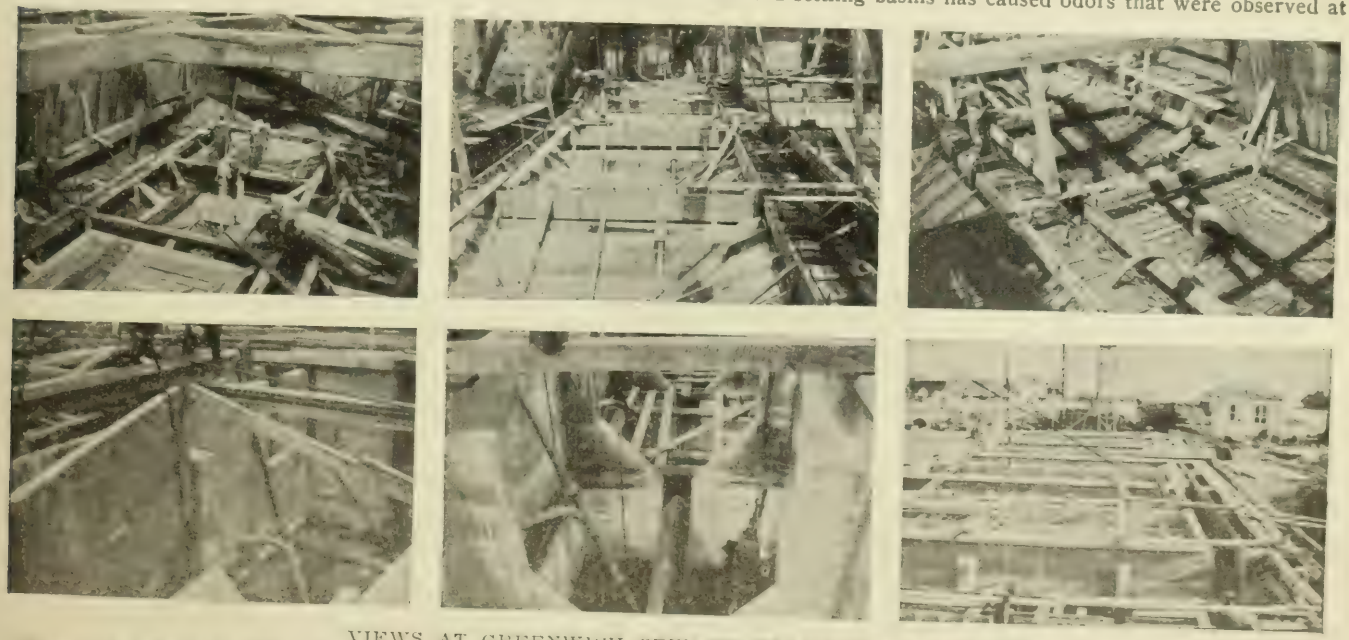
In the report on sewering a large part of New York city draining to Jamaica Bay, an abstract of which was published in the December 15th and 22d issues of Municipal Journal, the author, Kenneth Allen, discussed the subject of nuisance caused by sewage treatment plants as follows:

For some years the standard methods of oxidizing treatment of sewage have been intermittent sand filtration, contact beds and sprinkling filters, the preference for large installations having been for the last named. It has been claimed, however, that such plants are liable to produce odors that are objectionable to the neighborhood.

In view of the necessity of adopting some treatment to furnish a stable effluent if discharged into Broad Channel or the upper end of Big Channel, it has seemed desirable to secure more definite knowledge on this point than is generally found in print and inquiries were made concerning some 40 municipally-operated plants. Answers were received from 14 of these, including the more important installations in the United States, a summary of which is given in the accompanying table; to which may be added the following comments (quoted from the letters of the informants):

Batavia, N. Y.—No flies cause any trouble. . . . Should the sprinkling filters be shut down for a period of two days a very small fly will show iself. They become very numerous only in warm weather, but soon disappear after the filter is again in operation. My residence is located 129 ft. west of Imhoff tanks and the sludge drying beds are located 36 ft. northeast of house and I have never wished myself away from here since the plant is in operation.

Reading, Pa.—There have been no complaints due to the operation of the filters, though the cleaning of the settling tank and settling basins has caused odors that were observed at



VIEWS AT GREENWICH SEWAGE TREATMENT PLANT.
Upper row, left to right: Placing mat; constructing forms for Imhoff tanks; and placing reinforcing for tank bottoms.
Bottom row, left to right: Placing pre-cast side of upper or sedimentation chamber; interior of Imhoff tank showing sludge discharge pipe, slot beam, etc.; construction view, showing concrete distributing chute.

Odors Due to Sprinkling Filters.

No.	Town	Volume of Sewage Gals per Day	Condition at Tanks.	Delivery. Nozzles.	Distances That Odors Are Noticeable Unfavorable Conditions.	Noticeable Once a Month in Summer.	Objectionable Unfavorable. Conditions.	Objectionable Once a Month in Summer.
1	Atlanta, Ga.	13,000,000	2 plants Fresh 1 plant Stale	Fresh Stale	400 ft. 700-800 ft.	.....	.....	.....
2	Baltimore, Md.	45,000,000	Stale	Septic	1/3 to ½ mile	.....	1/3 to ½ mile	.....
3	Batavia, N. Y.	2,000,000	Slightly Septic	Slightly Septic	300 ft.	.....	None	None
4	Bloomington, Ind.	600,000	Fresh	Septic	1,000 ft.	.....	800 ft.	.....
5	Chambersburg, Pa.	700,000	Fresh	Fresh	½ mile	½ mile	1,000 ft.	1,000 ft.
6	Columbus, Ohio	21,000,000	Septic	Septic	1 mile	¼ mile	1 mile	¼ mile
7	Fitchburg, Mass.	2,123,000	Fresh	None over 8 hrs. old	300-400 ft.	.....	None	None
8	Gloversville, N. Y.	2,800,000	Fresh	Fresh	500 ft.	500 ft.	None	None
9	Indiana, Pa.	657,000	Fresh	Septic	200 ft.	400 ft.	.....	400 ft.
10	Lebanon, Pa.	800,000	Fresh	Septic	Practically no odor		300 ft.	None
11	Philadelphia, Pa.	1,250,000	Fresh	Fresh	500 ft.	Ordinarily less than 50 ft.	500 ft.	Ordinarily less than 50 ft.
12	Reading, Pa.	6,000,000	Fresh	Settled 7 hrs.	300 ft.	.....	300 ft.	.....
13	Schenectady, N. Y.	10,000,000	Fairly Fresh	Nearly Stale	700 ft.	.....	700 ft.	300 ft.
14	Washington, Pa.	1,400,000	Septic	Septic	1,500 ft.	400 ft.	1,200 ft.	300 ft.

No.	Distance to Nearest Residence.	Complaints Due to Odors, Flies, Etc.	Effect on Property Values Due to Construction and Operation of Plant.	Information Furnished by.
1.	300 ft.	None	Property values about plants have increased.	C. C. Hommon, Chem. and Bac't.
2.	1,300 ft.	Several complaints due to odors and flies	None	G. J. Requardt, formerly Div. Eng. in Ch. Sew. Disp.
3.	381 ft.	None	None	H. F. Lambert, Supt. Sew. Disp.
4.	1,500 ft.	Complaints from flushing about 3 times a year. None from plant.	.....	C. E. Danner, City Eng'r.
5.	600 ft.	None	None	J. H. Atherton, Boro. Eng'r.
6.	1,300 ft.	Complaints due to stale condition of sewage.	An alleged decrease. Unable to verify.	C. B. Hoover, Supt. Sew. Disp.
7.	1,000 ft.	None	None	D. A. Hartwell, Ch. Eng. Sew. Disp.
8.	900 ft.	Complaints due to sludge beds—none to filters.	Four properties 200'-600' from sludge beds deprec. 25-33 1/3%.	H. J. Hanmer, City Eng'r.
9.	1,300 ft.	One complaint due to sludge removal.	None	F. E. Daniels, Ass't Eng. St. Bd. Hlth.
10.	600 ft.	None	None	P. A. Volcker, City Eng'r.
11.	2,000 ft.	None	None	W. L. Stevenson, Ass't Eng. Sew. Disp.
12.	1,300 ft.	Complaints due to cleaning tanks—not to filters.	None	E. B. Ulrich, City Eng'r.
13.	1,100 ft.	Complaint due to undigested sludge in early opening of plant.	None	W. E. Weller, City Eng'r.
14.	1,000 ft.	Complaints from discharge of undigested sludge. None for 2 yrs.	Apparently none.	D. C. Morrow, Boro. Eng'r.

a distance of a quarter of a mile, due to the presence of worms in the sediment, on account of which complaints have been made. This is noticed more especially at the first spring cleaning.

Atlanta, Ga.—There are no residents near any of the sewage plants except the caretakers' houses. These houses are within 300 ft. of the plant, and the occupants have never been inconvenienced by odors from the plants. There has never been any complaint of any nature whatsoever that I am aware of registered against the plants either from odors, flies or mosquitoes.

Fitchburg, Mass.—I have visited the location many times of the nearest residences for the purpose of ascertaining if any odors were noticeable but have never been able to detect any trace. . . . The nearest buildings occupied for any purpose are residences situated about 1,000 feet from the filters. No complaints of any nature have been made by any occupants of residences either near the works or at a distance.

Columbus, O.—Any odor emanating from a sewage plant is regarded as disagreeable and objectionable. Residents have complained of odor. Cause—stale condition of sewage unavoidable without extra treatment.

Baltimore, Md.—Mean flow at Back River—at present about 45 million gallons. . . . The sewage is stale when it reaches the plant. Dissolved oxygen is never found in the raw sewage . . . the sewage delivered to the nozzles is septic. . . . Many times I have walked along the side of the filters and noticed no odor. Any odor from a disposal plant is likely to be called unpleasant and disagreeable by a resident. To me the odors from a sprinkling filter are seldom disagreeable; they seem to resemble the smell from a pile of oyster shells, or from a laundry. It is quite difficult, 400 yards away from the plant, to detect the origin of odors. As a general thing, I feel that sprinkling filters are blameless for a lot of the smells arising from a sewage disposal plant. Nothing has been done to rid the plant of the fly pest. The little familiar white fly is very evident at times at Back River. He multiplies by millions in the filter stone.

F. E. Daniels, Asst. Eng. State Dept. of Health of Pennsylvania, writes: There are usually other conditions, such as bad sludge beds or improper or badly kept scum or grit chambers, which greatly interfere with determinations concerning odors from the sprinkling filters themselves. If the sewage can be delivered in a fresh condition, I do not feel that there is much danger from odors.

Harrison P. Eddy—In my judgment, while I do not wish to belittle the danger of odors, there is a decided tendency to exaggerate the danger, when cases are brought into court to collect damages, or to enjoin sewage treatment plants. At a hearing in the court at Schenectady last fall, I was asked the following questions, to which I have appended my replies:

Q. "With a plant of this same character, and working efficiently, and in a warm period, when the atmosphere is at low pressure, and a slight movement of air, at what distance, if you can say, will odors from the plant be smelled?" A. This plant?"

Q. "An efficient plant of this same character." A. "Acting on this sewage?"

Q. "Acting on sewage just like this." A. "I should say not over 300 feet.

Q. "Even though it was a time when the air was very light and little circulation of air?" A. "Yes, sir."

I should state, however, that I think there may be evidence that odors have been noticed at greater distance than that I have mentioned in my testimony. These occasions, however, have been rare and probably not more than once a month on the average during the summer.

So far as can be learned from these answers as well as

from personal visits to a large number of plants, it is my opinion that if the sewage is reasonably fresh and the plant properly designed and operated, odors will rarely be noticed at a distance greater than 600 or 800 feet. But two of the cities heard from—Baltimore and Columbus—have had complaints traceable to sprinklers, and in both cases the sewage is delivered in a septic condition.

The question arises: How old must sewage be to reach this condition? Obviously this depends on the constituents of the sewage, the temperature, its access to the open air and its possible contact with decomposing deposits.

There is so little accurate information to be had as to the velocity of flow in sewerage systems that it is difficult to assign any definite period of collection that is necessary to bring the sewage to a septic condition. It would obviously be unfair to take this period as that required to deliver the sewage from the most extreme point of the system, as the tendency to septicize this presumably small portion of the whole would be partly neutralized by the larger subsequent volumes of inflow containing a residuum of oxygen. Probably a point somewhere between the centre of population and this extreme point would be more reasonably assumed as the point from which the oxygen is gradually depleted until reaching the treatment plant.

Mr. F. D. Smith, chief engineer of sewage works, Metropolitan Water and Sewage Board of Massachusetts, writes:

> The sewage of the Metropolitan sewers is, in general, in a septic condition when discharged through the outfalls, owing to the length of the mains. Some of these mains together with the lateral sewers have a length exceeding twenty-five miles.
>
> I am not able to state definitely the length of time before the sewage could be termed stale or septic. The chemist of the State Department of Health of this state, who makes examination of the condition of sewage in our sewers, informs me that after twenty to twenty-four hours, depending upon the season of the year, they regard the sewage as septic.

By reference to the table it is noted that the sewages of Batavia and Schenectady reach the plant at about the time when becoming septic. At Batavia decomposition seems to be promoted by deposits in the sewers, as "if the sewers are flushed once a year during the summer months the sewage arrives at the plant in a fresh state." This would be expected, as the extreme distance traveled is but about 2½ miles.

At Schenectady the extreme flow is about 6 miles and that from the centre of population about 4½ miles as measured along the sewer. A careful computation by Edward H. Prentice indicates the extreme distance and time of travel by two routes to be:

Route 1. From State Street 5.9 miles, 4 hrs. 36 mins.

Route 2. From 15th Street 6.45 miles, 5 hrs. 56 mins.

According to W. E. Weller the sewage is fairly fresh on arrival but is approaching staleness on reaching the nozzles after settling.

From the table we also see that the sewage arrives at one of the Atlanta plants and at the Baltimore, Columbus and Washington plants in a stale or septic state.

The extreme distance of travel at Atlanta is about 5 miles, and that from the centre of population 4½ miles. The maximum time of travel is about 4½ hours, due in part to the flow for about ¾ mi. through an old creek bed which will be replaced by a sewer later, when the sewage is expected to arrive in a fresh condition.

At Baltimore the sewage from the centre of the city travels about 8 miles and is some 5 hours old when received, although some is probably derived from a distance exceeding 10 miles.

At Columbus the centre of population is stated by C. B. Hoover to be four miles but the most extreme point ten miles from the plant.

At Cleveland a travel of 5 miles renders the sewage "distinctly stale."

From the above it would appear that sewage brought from a distance of over 6 or 8 miles from the centre of population under ordinary conditions of flow and warm weather is likely to arrive in a stale condition. This is confirmed by the condition of the sewage reaching the sewage testing station at Cleveland, where it arrives in this condition when 6 or 8 hours old, while, indicating this to be about the limit, the sewage from Fitchburg reaches the plant when most of it is not over three but some of it nearly eight hours old in a fresh condition.

This conclusion, being based upon so few examples, must of course be considered as tentative and liable to modification and in any case the limiting time depends, as already pointed out, on such matters as temperature and contact with the air.*

The foregoing discussion indicates in a general way that a nuisance may arise from a sprinkling filter plant; that experience in other cities goes to show that such nuisances are more apt to be traced to other features of the plant, such as sludge handling, than to the operation of the filters themselves; and that odors are liable to be produced during warm weather by sprinkling filters handling a stale or septic sewage that may affect property values located a quarter of a mile or more from the plant.

It is probable, too, that sewage delivered from ordinary septic tanks to sprinkling filters is more liable to cause odors than when delivered from Imhoff tanks, not only on account of the longer retention customary with the former type, but on account of the withdrawal of oxygen due to contact with the decomposing sludge and to absorption of the malodorous gases evolved during this decomposition.

Where large volumes of sewage are to be treated, therefore, sprinkling filters should handle fresh sewage only, or else be placed far from habitable property.

CATCH BASIN CLEANING IN CHICAGO.

Chicago is laid out on a level plain, in consequence of which the gradients of many of the sewers are below those required to produce self-cleaning velocities, the result of which is that there is more or less depositing of material in the sewers. This necessitates frequent flushing of the sewers and occasional cleaning by machinery of one sort or another. This condition also makes it essential that as much street dirt as possible be kept out of the sewers, and consequently catch-basins are used with all storm-water inlets. With so many catch-basins and so great necessity for insuring their effective action, it becomes necessary to clean all of them frequently, the result of which is that the cost of this work runs into very large figures.

In order to secure the most effective and cheapest method of cleaning the basins, the present superintendent of the department, George C. McGrath, has tried apparently every method of cleaning basins that appeared practicable, and has effected a considerable reduction in the cost of catch-basin cleaning When he was put in charge of the department four years ago, the cost of cleaning basins averaged $3.90 for each cleaning of a basin. During these four years the cost has been reduced, last year's average being $2.97, while the average cost per cleaning for the four years has been $3.23.

*In the Emscher District in Germany sewage effluents are carried many miles in open channels with an average velocity of 2 3 feet per second and it is claimed that instead of becoming septic the sewage improves through contact with the air and the effect of the sunlight.

During the past four months Mr. McGrath has been trying out a new method which promises to reduce the cost still more. This method consists of the use of an Otterson Auto-Eductor. He is using this in the regular work of the department, keeping accurate cost data, and finds that the cost to clean by this method has been $1.29, this including interest and depreciation on the cost of the machine, repairs, oil, gasoline, supplies, a chauffeur at $115 a month, one laborer at $4.60 a day and an assistant at $3.30 a day of 8 hours.

Mr. McGrath has just made a report recommending the adoption of more efficient means of cleaning sewers and catch-basins for the ensuing year. He shows that with his present organization, including the one Eductor owned by the city, retaining the horse-drawn tanks now used for sewer flushing and the old organization for cleaning basins not reached by the Eductor, the cost of 9 months of work would be $495,580. If, however, six more Eductors be purchased as he recommends, and a tractor for hauling sewer-flushing tanks (a sewer-flushing tank so drawn being able to do the work of 3 horse-drawn tanks), he estimates that the reduction in cost of cleaning basins and sewers would be sufficient to furnish the funds for purchasing these appliances, and the cost still be $72,970 less than the estimate given for work under present conditions. Since the appliances would be on hand for the following year, the saving for that and the succeeding years would be considerably greater. (The Eductor is a contrivance for pumping out the contents from catch-basins, stirring them up by a water jet if necessary, which was described in our issue of March 15th, 1917.)

Considering the distances over which this material must be hauled to the nearest dump (basing this upon records of actual work done in the regular way), the Eductor would be able to remove and carry to the dump 3 loads a day, each load containing the material removed from 6 basins, giving a capacity of 18 basins a day. This allows one hour and 10 minutes for dumping each load. If the haul is shorter, more loads can be made in a day, with corresponding reduction in cost per basin. Using the labor cost given above by Mr. McGrath's figures makes the cost per basin about 70c. Comparing the labor cost with the total cost given by Mr. McGrath, it appears that, if all figures given are average figures (as they are believed to be), his allowance for interest, depreciation, oil, gasoline and repairs is nearly equal to the labor cost and is apparently ample to give a conservative estimate of the true total cost of the work.

QUALIFICATIONS FOR CITY MANAGER.

At the recent meeting of the City Managers' Association, H. M. Waite, city manager of Dayton, O., as chairman of a committee on the subject, submitted the following report on "City Manager as a Profession":

1. Commissions have made a city manager profession by showing a willingness to go outside of their own communities for city managers.
2. City managers are receiving invitations to other towns and there now have been seven cases of transfer, showing that the tendency is to recognize the existence of professional experience.
3. City managers recognize that a career lies before them in this field and are seriously building up their experience to make it a life career.

The profession can be said, therefore, to have come into existence with every indication of continuance.

It is interesting to note from the registration at the City Managers' Convention this year that out of 25, about 95 per cent are engineers, indicating that commissioners turn to the municipal engineer for managers.

1. Small cities (under 20,000 pop.)
   Preferably engineer. Executive ability is first essential.
2. Larger cities (20,000-200,000 pop.)
   Executive ability first essential. Engineering less essential.
3. Large cities (over 200,000 pop.)
   Executive ability prime essential.

CHICAGO'S EDUCTOR AT WORK.

Your committee believes that city manager qualifications may, from present experience, be classified as follows:

TRAINING CITY MANAGERS.

Experience shows that actual experience is considered as most valuable equipment.

Education—The attempt to lay out courses by universities for training city managers is handicapped by the fact that a major requirement is native executive ability, which cannot be taught. A university cannot train a man to be an ordinary business executive. It cannot propose a man to step into the management of a city. It can train him to step into the management of a village. The attempt to lay out a course reveals the fact that the entire field cannot be covered by thoroughness in every branch that confronts a manager.

It is essential, therefore, that, rather than give a man a smattering of all the many subjects, he be thoroughly trained along some one or two lines such as engineering or accounting, or whatever may be his natural bent, the balance of his time in college being devoted to obtaining a general knowledge of the other fields.

We believe the National Municipal League could fill a useful function by maintaining a roster of city managers, with their experience, as well as a roster of competent men who are desirous of entering this field.

ROAD SIGNS IN NEW JERSEY.

The Motor Vehicle Act of New Jersey requires all counties in that state to place signs on all bridges before the first day of 1918, and Commissioner Dill desired to have these signs uniform throughout the state. For this reason the County Engineers' Association has adopted a sign to be used by all the counties on their bridges. A committee of the association, of which Roscoe Parke McClave of Bergen County is chairman, is working upon a design for a suitable direction marker and danger signal to be adopted by the County Engineers' Association for general use throughout the state.

The bridge sign adopted contains the words: "Capacity of Bridge .... Tons. Speed Limit, 6 Miles per Hour." The sign is 16 inches high and 36 inches long. The letters are to be white on a blue field, experiments having shown that this combination can be read at a greater distance than any other.

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Change of Address.

Subscribers are requested to notify us of changes of address, giving both old and new addresses.

Contributed Articles and Reports.

Contributions suitable for this paper, either in the form of special articles or as letters discussing municipal matters, are invited and paid for.

City officials and civic organizations are particularly requested to send to Municipal Journal regularly their annual and special reports.

Information Bureau.

Municipal Journal's Information Bureau, developed by twenty-one years' research and practical experience in its special field, is at the command of our subscribers at all times and without charge.

A LAW AGAINST PROGRESS AND UNITED SENTIMENT.

A dairy farmer is reported to have made a discovery. In an effort to conserve grain and increase his profits, he mixed sawdust with the food for his cattle, gradually increasing the amount each day and correspondingly decreasing the amount of grain. He reports that the experiment was going on finely, except that the obstinate cows decreased their milk yield, but just as he had reached the point of giving them nothing but sawdust, they inconsiderately up and died. Congress has resolved to make a similar experiment, substituting the technical publications of the country for cows, the taxes they pay for the milk, and second-class postal regulations for the sawdust; and it hardly can be expected that the result will not be the same.

Just a year ago Municipal Journal informed the readers that Congress was considering a bill greatly increasing the postage on publications and also proportioning the rate to the distance the periodicals were carried. Several scores of papers proved by figures from their books that this increase would more than wipe out their entire profits, and it was thought that the inequity and injustice of the bill was finally recognized. At the last moment before adjournment, however, Congress passed this and other crudities in a revenue bill. The section relative to second-class postal rates, however, was modified so as to take effect progressively, the increase to be made a little at a time for several years but ultimately reaching the point of entirely eliminating profits and presenting to the periodicals the alternative of living on sawdust or obstinately dying. The ultimate result will be the same, but the struggle against extinction will be prolonged, enabling the publications to appreciate most vividly the feelings of the cows on whom the dairyman experimented, or those of a mouse which furnishes amusement for the cat that has captured it.

Publishers are perfectly willing to pay the same taxes on their business as do men in all other lines, and do pay them. But the postal bill is not a tax, but a direct increase of from 50 per cent to 500 per cent on a very considerable part of the cost of carrying on its business. The result cannot fail to be other than that stated—this increase will entirely wipe out the profits of most of the publications, and they must go out of business. Aside from this, publishers have had their business troubles like other business men during the past few months, but have not annoyed their subscribers by discussing them. But the effect of this law is of such immediate interest to subscribers themsleves that it seems desirable to call their attention to it.

Subscribers to technical and trade publications presumably find them of some value or they would not subscribe for them. Possibly many do not realize what service they do obtain through the periodicals, but we suggest that they try to imagine themselves obtaining no news concerning any of the matters connected with their professional work other than what they can obtain from the daily newspapers—no information concerning scientific or technical progress, no news concerning work about to be done or contracts that have been let, no advertisements from which to select the materials and appliances needed in carrying on public work, no news of the doings of technical societies. There can be no question that the immense progress in all lines involving technical processes that has been made during the past century has been due to the universal and immediate dissemination of information concerning every improvement made in every part of the world. If this is stopped, progress in these lines will stop also.

Meantime, during this struggle against extinction, the baleful effect of the zone system will be felt. At the time of the civil war, the government at Washington made strenuous efforts in the midst of its military stuggle to secure the construction of a railroad to the Pacific coast, in the belief that this would be of the utmost assistance in retaining as a united country those states that had not seceded. No one has ever questioned the wisdom of thus binding the east and the west with ties of steel. What shall we say of a Congress which, in the beginning of a far more serious conflict, endeavors to separate the west from the east by foolish legislation which will destroy the most effective avenues by which the several sections of the country exchange understanding and sympathies?

This division of the country would seem to be unavoidable if the zone system goes into effect. Not only technical but all other periodicals will find it impossible to pay the postage rates to subscribers more than a few hundred miles distant (although some of those in the distant zones may themselves be willing to pay the excess postage). This will probably give rise to local literary publications, and possibly technical ones also, a few for the east, others for the middle part of the country, and still others for the west. This vast country is held together as a unit not by its laws, but by sympathies and mutual understandings between the several states. It is only within a few years that the north and south have understood each other and that the east and west have mutually appreciated their several points of view, and, learning these things, have been willing and able to adjust their opinions and compromise their differences each with the other. This exchange of ideas and sympathies can be brought about only by the printed word—it is impossible for a sufficient number of citizens in these widely separted localities to become acquainted face to face. If the free interchange of such ideas through the medium of national rather than sectional periodicals should be largely or wholly destroyed

by an iniquitous postal law, it is inevitable that there will again arise an absence of mutual understanding and a division of sentiment. A country divided against itself will fail; and at this time the country must not fail.

If those who read this feel, as we do, that the repeal of this postal legislation is necessary to avert a calamity to the country, they will be doing a patriotic act by making their views known unmistakably to their representatives in Congress.

HIGH PRESSURE FIRE SYSTEM OF CINCINNATI

Plans Considered for a Supply for the System—Pumping vs. Gravity—Latter Adopted, with Pumping, if Proved Necessary.

By J. A. HILLER, Superintendent of Water Works.

WATER SUPPLY FOR THE SYSTEM.

This question has occasioned more controversy than any other feature of the work and perhaps more than has occurred in any other city where a high pressure system has been installed. The local conditions and the topography of Cincinnati are very different from those in most other cities. No portion of Cincinnati can be compared with the high-pressure district in New York. The congested or high-value district of Cincinnati lies in an almost level portion of the valley at an elevation of about 550 feet above sea level or about 120 feet above low water in the Ohio river. Immediately east and north of this district is a range of hills rising about 300 feet higher. Owing to these differences of level, the city water supply is divided into two services. The business district is supplied from the main pumping station, through a single 60-inch main laid along Eastern avenue, nearly parallel to the river bank, with pump pressure of 75 to 90 pounds, giving a resulting hydraulic elevation in this service of about 665 feet above sea level. The Eastern Hills service is supplied from the same pumping station, with another group of pumps, through two 48-inch mains laid along separate routes. The pump pressures vary from 190 to 210 pounds, giving a resulting hydraulic elevation in this service of from 950 to 985 feet.

While the plans were being prepared for the distributing mains of the high pressure system and a separate pumping station was still being considered, the 20-inch main in Broadway was continued to Reading road and Elsinore avenue, for the purpose of keeping the system filled at all times and so that, in case of any interruption due to breakdowns at the pumping station, a supply could be obtained from the Eastern Hills service.

During the year 1916, after sufficient money had been provided for the completion of the system, a detailed study was made of the water supply problem; the existing systems in eastern cities were visited to determine the relative merits of the several kinds of pumping units and their motive power, and a very complete report was made and estimates of cost prepared of six types of pumping engines and also of a gravity system of supply from the Eastern Hills service. Briefly these plans were as follows:

In all the plans considered, a reinforced concrete structure was proposed, faced on the outside with brick and stone trimmings, having interior walls faced with tile or enameled brick, tile floors, a basement for suction and discharge mains, valves, etc., office room, sleeping quarters, store room, bath rooms, hot water and modern plumbing and heating. The exterior of the building to be protected by fire curtain and all parts to be of non-combustible material. The size to be such as may be necessary to accommodate the pumping machinery, with room for additional units in the future.

Seven plans were studied, which may be described briefly as follows:

PLAN "A." Steam Pumping Engines.—The pumping machinery under this plan consists of three horizontal, coupled, simple Corliss, crank-and-fly-wheel, non-condensing pumping engines, with cast steel pump ends, double acting, center outside-packed plungers. Water tube boilers with automatic stokers and proper coal storage to be provided. The capacity of each unit to be 4,000 g.p.m., making a total of 12,000 gallons as the present capacity of the station. The steam pressures carried to be 150 and 175 pounds, 300 feet piston speed, 50 r.p.m.; capable of operating at 80 r.p.m. at which speed the discharge will equal 6,400 g.p.m. per unit. Maximum discharge pressure 300 pounds, average pressure on suction 50 pounds.

To accommodate the above machinery, with room for a fourth unit, will require a building 65 feet by 135 feet.

Estimated cost of real estate, buildings & machinery..$486,570.00
Annual cost of operation and fixed charges..... 59,081.90

PLAN "B." Steam Geared Turbines; Centrifugal Pumps.—The pumping machinery considered under this plan consists of steam geared turbines driving centrifugal pumps, non-condensing, each unit to have a capacity of 2,000 g.p.m., a total of 10,000 gallons as the present capacity of the station. Water-tube boilers, with automatic stokers and proper coal storage to be provided. The steam pressures carried to be 150 and 175 pounds. 5,000 to 1,800 r.p.m. The maximum discharge pressure to be 300 pounds, the average pressure on suction 50 pounds.

The building required for this class and arrangement of machinery and providing room for three additional units will be 65 feet by 135 feet.

Estimated cost of real estate, building & machinery..$404,040.00
Annual cost of operation and fixed charges..... 52,704.80

PLAN "C." Gas Engines; Triplex Pumps.—This plan is based upon the installation of five vertical, three-cylinder, gas engines (using natural gas), driving (through single reduction gears) vertical, triplex power pumps, with three double-acting pistons, 300 to 50 r.p.m. Capacity of each unit 1,800 g.p.m., total present capacity of station 9,000 gallons, pressures same as Plans "A" and "B."

This, with room for three additional units, will require a building 80 feet by 105 feet.

Estimated cost of real estate, buildings & machinery..$400,470.00
Annual cost of operation and fixed charges..... 42,146.90

PLAN "D." Oil Engines; Triplex Pumps.—In estimating upon the cost of this plan, the pumping machinery considered consists of horizontal, two-cylinder, four-cycle oil engines driving (through single reduction gears) vertical, triplex power pumps, 164 to 54 r.p.m. The capacity of each unit to be 1,800 g.p.m., giving a total of 9,000 gallons for the five units to be installed. Pressures as in other plans.

This, with room for three additional units, will require a building 80 feet by 140 feet.

Estimated cost of real estate, buildings & machinery..$423,360.00
Annual cost of operation and fixed charges..... 43,249.20

PLAN "E." Oil Engines; Centrifugal Pumps.—This plan considers the use of horizontal, two-cylinder, four-cycle, engines driving (through increasing double reduction gears) four-stage centrifugal pumps, 165 to 1,190 r.p.m. The capacity of each unit to be 2,000 g.p.m., a total of 10,000 gallons for the five units proposed for the present. Pressures as in other plans.

The building required for this installation with room for three additional units to be 80 feet by 140 feet.

Estimated cost of real estate, buildings & machinery..$431,760.00
Annual cost of operation and fixed charges..... 43,937.20

PLAN "F." Electrical Motors; Centrifugal Pumps.—This plan provides for using constant-speed, induction motors, direct connected to centrifugal pumps, flexible couplings, three-phase, sixty-cycle, 440 volts. Oil switches and stationary transformers, speed 1,180 r.p.m. The capacity of each unit to be 2,000 g.p.m., total for five units 10,000 gallons. Pressure as in other plans.

Building with room for three additional units, 65 feet by 85 feet.

Estimated cost of real estate, buildings & machinery..$339,465.00
Annual cost of operation and fixed charges..... 51,476.55

PLAN "G." Gravity Supply from the Eastern Hills Service.—This plan considers the use of the 20-inch connecting main already mentioned, the laying of a 24-inch supply main in another location connecting the Eastern Hills service with the high pressure mains, the installation of a 17,000,000-gallon, vertical, triple expansion, crank-and-fly-wheel pumping engine in the main station, and the replacement of the present boiler equipment at this station with modern high-duty units of large capacity.

Estimated cost of additional main, machinery and boiler equipment	$299,591.25
Annual operating expenses	Nothing
Annual fixed charges, interest and sinking fund	21,000.00

In the selection of the water supply, all local conditions had to be thoroughly considered. If a separate pumping station is to be built, the most important considerations are, reliability, rapidity of starting, readiness to serve, reasonable cost and operating expenses. Freedom from outside sources of interruption should also be considered. The most reliable station would be one which can be made self-contained; that is, not dependent upon other power plants or outside agencies. The steam and oil engine plans are the only ones which can be self-contained. The high first cost and heavy stand-by charges for steam and the high first cost of oil engines are objections. Gas engines are dependent upon city gas mains as well as upon the long supply main from the gas fields to the city. Also the first cost of a gas engine station is large. The electric motor-driven pumps present advantages of extreme simplicity of operation and low first cost, but are subject to the objections of being dependent upon another plant for current, the contingencies of long transmission lines and very heavy stand-by charges. All plans using a separate pumping station are subject to the reliability of the large mains in the central service of the city water supply.

The gravity system presents the advantages of low first cost, no stand-by charges or cost of operation and maintenance, is reliable and will deliver water at a reasonable and workable pressure. Its only disadvantages are that an extreme high pressure is not available, and it is subject to the reliability of the large mains in the Eastern Hills service of the city water supply.

The estimated cost of real estate, buildings and machinery under plans "A," "B," "C," "D" and "E" was more than the funds available. Plans "F" and "G" are within the available resources.

After a study had been made of the systems used in other cities and noting their methods of operation and especially noting the average and extreme pressures used at times of fires, it did not appear necessary to expend a large sum for installation and encumber the city with a large annual cost for operation. It was therefore recommended that Plan "G" was sufficient for all purposes within the district to be protected.

This brought forth a storm of protest from the insurance interest, which claimed that the available pressure was not adequate for furnishing the largest and most powerful streams which may be reasonably expected, and that the plan did not offer a maximum degree of reliability. It was admitted that this plan would be sufficient for 99 per cent or more of all fires likely to occur, but to take care of a possible fractional percentage of fires a separate pumping station should be built in addition. That is to say, that the city should expend a large sum for a pumping station and assume a large annual operating expense to provide against this chance. This appears to be carrying insurance to an absurd limit, as the premium demanded is not justified by the additional protection.

A plan was suggested by them as a substitute for Plan "G" practically as follows: Install a 17,000,000-gallon pump at the main station, capable of delivering through 16,700 feet of 36-inch steel main, laid in Eastern avenue parallel to the present 60-inch central service main. The pressure within the high service district to be 250 pounds. When this plan was carefully considered, it was noted that the present Eastern Hill pumps could not discharge at such a pressure, thus leaving the high pressure system with a single pumping unit; and as no pump has yet been built that can give continuous service, the reliability of this plan was very doubtful.

It was then suggested that it would be better to instal two 15,000,000 or 17,000,000-gallon pumps, turbine-driven and designed for about 110 pounds net pressure; these to be so gated as to take suction from the central service pumps at 75 pounds pressure and discharge into the 36-inch main at about 185 pounds, giving a resulting pressure of about 150 pounds for fire fighting. Connections to be also made for taking suction from the Eastern Hills service at 195 pounds, giving a discharge pressure of about 300 pounds. This arrangement would have resulted in a complicated system of piping and valves and would have required extremely careful operation. The burden of this excess pumping would still have to be borne by the present Eastern Hills pumps, already working to nearly their capacity. The size of steam cylinders necessary for a 17,000,000 gallon pump with 250 pounds discharge would have been greater than any yet constructed and would have required a floor space greater than available. The installation of two units would have taken all remaining space in the station, leaving no room for the installation of Eastern Hills pumps. These additional units will be necessary in the near future. This plan is subject to all the objections of Plan "G" and offers as its only advantage an extreme pressure which will never be needed or used.

Estimated cost under this plan	$548,084.25
Annual cost of operation and fixed charges	44,365.90

By this time the pipe laying had so far advanced that a test could be made to determine the quantity of water and the resultant pressures, using the 20-inch connection to the Eastern Hills service. Two hydrants were used, and four lines of 2½-inch hose, each 50 feet in length, and one line 200 feet long, were run into a fire tower having 2, 2¼ and 2½-inch nozzles. Three lines of 2½-inch hose, 200 feet in length, were siamesed into a 2¼-inch deluge nozzle. The static pressure before test was 177 pounds at the hydrants, and the pressure at the main station was 195 pounds. The maximum flow from the nozzles as recorded by pitot gagings was 3,400 gallons per minute. The pressure during this flow was 167 pounds. A greater flow would have been tried but the sewers were unable to carry more and the test had to be stopped to avoid flooding of cellars.

Upon the basis of the above test using only one supply main, if the proposed 24-inch supply were also in use, about 8,500 gallons per minute could have been delivered with the same loss of head, and to deliver 12,000 gallons per minute, both mains in service, the resultant pressure would have been 157 pounds. Had the pump pressure been increased to its maximum of 210 pounds, the resulting hydrant pressure would have been about 170 pounds with a flow of 12,000 gallons. This may therefore be assumed as the maximum available hydrant pressure with Plan "G," and is only 35 pounds less than was recorded for the New York system, Jan. 29, 1909, when five large fires occured at one time and when 33,500 gallons were being used. Cincinnati conditions are so different from those in lower Manhattan, that the degree of protection is fully equal. It should also be noted that only Plans "A" and "G" are estimated upon a 12,000 gallon capacity.

A survey was made of the number of high buildings within the protected area and the result is shown in the following table. The heights of the last five are taken from plans and are correct. The heights of other buildings are taken at 12 feet per story, plus 10 feet. In arriving at the nozzle pressure, it was assumed that when

water was used at the heights given there would be enough used at other heights to reduce the hydrant pressure to 160 pounds, a stream flow of 260 gallons per minute was assumed to flow through 800 feet of 3-inch hose.

Number of Buildings	Number of Stories	Height	Nozzle Pressure at Roof	Reach of Stream with 1 Inch Nozzle Horizontal	Vertical
110	6	82	74	87	74
41	7	82	69	85	72
24	8	106	64	82	70
9	9	118	58	79	67
10	10	130	53	74	62
4	11	142	48	70	60
4	12	154	43	67	55
1	14	216	..	..	..
1	16	212	..	..	..
1	17	232	..	..	..
1	18	257	..	..	..
1	30	440	..	..	..

From the above it will be noted that in all cases, except the last five buildings, there is a good working pressure even at the tops of the buildings. These last being all modern fire proof buildings with fire lines and fire pumps, it is hardly probable that a serious conflagration will start in such buildings. Of the above buildings, 68 are equipped with automatic sprinklers.

When it is further considered that none of the portable fire engines are to be abandoned and they can be used to boost these pressures in extreme cases, it is reasonable to believe that a water supply at the pressure mentioned in Plan "G" will give ample fire protection and prevent any serious conflagration in the territory protected.

It was finally admitted that Plan "G" would greatly improve the fire fighting facilities of this city and be of great value, if properly handled, but this not being what is termed standard high pressure equipment, no credit in insurance rates would be given. Both pumping station and Plan "G" were now demanded. As a compromise, I submitted a supplementary report outlining Plan "H" as follows:

If it is thoroughly understood that I do not retract any statements formerly made in regard to the sufficiency of Plan "G" and that I again maintain that under that plan 12,000 gallons per minute can be delivered into the high pressure district at a hydrant pressure of at least 150 pounds, then the following suppositions and conclusions can be considered:

If in the future it is found that 12,000 gallons per minute is not sufficient for fire fighting;

If in the future it is found that 150 pounds minimum hydrant pressure is sufficient;

If in the future the continual breaking of the 36-inch main in Woodburn and McMillan streets jeopardizes the fire fighting facilities;

If in the future the continual breaking in the gridiron system of the Eastern Hills service so reduces the pressure and quantity available as to cripple the high pressure system;

If in the future, Plan "G" is positively proven to be a failure;

Then and then only, the following can be considered as an additional water supply:

PLAN "H."—Install in the abandoned Eden Park pumping station such pumping units as at that time may be considered the best for the service required. The piping to be so arranged that suction can be taken from either the two 24-inch Eastern Hills mains or from the Eden Park reservoirs. The discharge to be through the 24-inch main proposed in Plan "G." This plan will avoid the purchase of any real estate or the erection of a building. There will be two sources of supply for the pumps. The pumps can discharge at any predetermined pressure. These pumps could pump from the reservoirs into the Eastern Hills service should the occasion arise. The valves to be so arranged that one reservoir will be kept filled, giving a reserve of 45,000,000 gallons in case of a serious break in the central service mains. All advantages of Plan "G" would be retained and nothing spent on that plan would be wasted, but it would form a part of the modified plan. The additional cost to add these pumps in the future would not exceed $150,000.

This modified plan will offer a greater degree of reliability than the system installed in any other city and meet every objection that has been proposed, and is less expensive than any of the plans considered using separate pumping units.

No further effort has been made to please the insurance interests and it has been decided to proceed with the completion of Plan "G" and prove it to be sufficient.

The unusual industrial conditions resulting in the extreme high price of materials and labor entering into construction has made it necessary to abandon the entire completion until more normal prices prevail. All mains already laid are so connected that they are available for use and the Fire Department has been instructed in their operation. The design and supervision of construction have been under the direction of the writer.

TURBINE SEWER MACHINE INFRINGEMENT.

The Turbine Sewer Machine Renovating Co. recently sued William J. Stevenson, who also was manufacturing machines for cleaning sewers, for infringing patents owned by the former company, and a decree has just been handed down by the U. S. District Court of the Eastern District of Wisconsin enjoining the defendant from "making, selling or using any sewer cleaning devices containing or embodying any of the inventions set forth in the fourth and seventh claims of said Letters Patent of the United States No. 1,036,735, and in each and all of the claims set forth in said Letters Patent No. 1,163,624." The complainant recovers the profits made by the defendant by reason of the infringement, and damages sustained by the complainant, and the cost of the suit.

In connection with the injunction, the court affirms the validity of the claims above described, that is, two of the first patent and all seven claims of the second; also that these patents are the sole property of the Turbine Sewer Machine Renovating Co., and that "within six years past the defendant has infringed the same . . . by making, using, and selling within the United States sewer cleaning devices having therein deflectors and blades embodying the inventions described in said Letters Patent."

GASOLINE CONSUMPTION BY FIRE APPARATUS

Average Miles Run Per Gallon Last Year by Each Kind of Apparatus in Each of Two Hundred and Fifty Cities.

It is a practice in several hundred cities of the country, and one that should be adopted by all the others, to keep an account of the miles run by each piece of motor fire apparatus and the amount of gasoline used by each. In this week's issues (to be concluded in next week's) we are giving the miles run per gallon by each kind of apparatus in each of about two hundred and fifty cities. These figures were furnished by the chiefs of the respective cities. They presumably refer to the latest year of record, and represent, in each case, the average of all apparatus of each particular kind that was in service.

It is, of course, to be expected that there would be considerable variation in the figures, since the mileage per gallon will depend more or less upon the number of runs made and the speed as well as upon the weight of the apparatus, the engine, and the experience and care of the driver. Each of these, unless perhaps the character of the engine, would probably tend to lower the mileage as compared with pleasure or commercial cars. A summary of the figures will be given next week.

MOTOR APPARATUS OPERATION. MILES RUN PER GALLON OF GASOLINE.

City and State.	Chief's Cars.	Chemical & Hose With Ladders.	Chemical & Hose Without Ladders.	H. & L. Trucks.	Triple Combinations.	Hose Wagons.	Tractors.	Chemical Engines.	Gasoline Pumping Engine and Hose.	Gasoline Pumping Engine Without Hose & Chem.	Gasoline Pumping Engine With Chemical	Gasoline Driven Steam Pumper	Fuel or Service Wagons	Repair Wagons	Squad Wagons.	Water Towers
Alabama:																
Brewton	....	....	....	....	....	7	....	....	....	....						
Gadsden	....	10	....	....	....	....	....	....	....	....						
Selma	14	....	....	....	....	....	....	....	....	....						
Arizona:																
Phoenix	14	8	12	....	....	....	....	....	....	....						
Arkansas:																
Ft. Smith	12	....	....	....	....	....	....	....	6	....		8				
Prescott	....	10	10	....	....	....	....	....	8	....	..	..				
California:																
Alameda	5½	..	6	5	....	....	....	....	....	....						
Berkeley	11	2	....	2	....	2	1	3	....	1½		1½	1½			
Coalinga	....	....	7	....	....	....	....	....	....	....						
Emeryville	....	....	....	....	....	....	....	....	....	....						
Hayward	16	14	....	....	....	....	....	10	....	....						16
Long Beach	14	....	....	....	....	....	....	....	....	....						
Modesto	12	8	....	12	....	12	....	12	13	....		13		17		
Monrovia	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....
Oakland	12	5	....	....	6	....	....	....	....	....						
Pasadena	17	....	....	4	....	....	....	....	....	....						
Redlands	20	6	....	....	....	....	....	....	....	....						
San Leandro	12-15	10	....	....	....	....	....	....	....	....						
San Rafael	16	10	....	....	....	....	....	....	....	....						
Santa Monica	16	5	....	....	....	....	....	....	....	....						
Watsonville	18	....	....	....	3½	....	....	....	....	....						
Whittier	....	....	....	....	....	....	....	....	....	....						
Colorado:																
Ft. Collins	....	10	....	....	....	....	....	....	10	....						
Grand Junction	....	14	....	....	....	....	....	....	....	....						
Longmont	....	15	....	....	....	....	....	....	....	....						
Trinidad	16	....	12	....	....	....	....	....	....	....						
Connecticut:																
Danbury	16	14	10	10	12	....	....	....	....	....						
So. Manchester	12	6	6	6	....	....	....	....	6	6						
Stratford	....	12	....	....	....	10	....	....	....	....						
Suffield	17	....	10	....	....	....	....	....	....	....						
Torrington	....	7	....	....	....	....	....	....	....	....						
Waterbury	11	1	....	3	3	5	....	5	6 3-5	....						
District of Columbia:																
Washington	10	....	....	5	....	6	....	....	5	5		1				
Florida:																
Daytona	8	6	....	....	....	....	....	....	....	....						
Sarasota	....	....	....	....	11	....	....	....	....	....						
West Tampa	....	15	....	....	12	....	....	....	....	....						
Georgia:																
Americus	....	8	....	....	8	....	....	....	....	..	8					
Athens	....	6	....	....	....	....	....	....	....	....						
Brunswick	6½	5	....	....	5	....	....	....	....	....						
Carrollton	....	12	12	....	....	12	....	....	....	....						
Moultrie	....	....	....	....	....	....	....	....	....	....						
Newman	15	....	....	....	8	....	....	....	....	5						
Rome	20	15	....	....	12	20	20	....	12	....						
Idaho:																
Boise	12	7	....	....	....	....	....	....	....	....						
Pocatello	8	8	....	....	....	....	....	8	4	....						
Illinois:																
Aurora	7	6	....	....	....	....	5	....	....	....						
Cairo	18-20	18-20	....	....	10	....	....	....	10	....	10					
Champaign	10	8	....	8	....	....	....	....	6	....						
Chicago Heights	14	....	....	....	....	....	....	....	....	....						
East Moline	....	....	10	....	....	....	....	....	....	....						
Elgin	10	6	....	....	....	....	....	....	....	....						
Evanston	12	....	....	....	1¼	....	....	....	....	....						
Joliet	10	6	....	6	4	....	10	....	6	....						
Murphysboro	16-20	....	....	....	....	....	....	....	....	....						
Paxton	....	....	....	10	6	....	....	....	....	....						
Pekin	....	....	....	....	6-7	....	....	....	....	....						
Witt	....	15	....	....	....	....	....	....	....	....						
Indiana:																
Anderson	6	....	....	....	....	....	....	....	....	....						
Elkhart	20	2	....	....	....	10	....	....	3	....						
Frankfort	25	13	....	....	....	....	....	....	2	....						
Gary	13	12	12	12	....	12	....	....	....	....						

MOTOR APPARATUS OPERATION. MILES RUN PER GALLON OF GASOLINE (Continued).

City and State.	Chief's Cars.	Chemical & Hose With Ladders.	Chemical & Hose Without Ladders.	H. & L. Trucks.	Triple Combinations.	Hose Wagons.	Tractors.	Chemical Engines.	Gasoline Pumping Engine and Hose.	Gasoline Pumping Engine Without Hose & Chem.	Gasoline Pumping Engine With Chemical.	Gasoline Driven Steam Pumper.	Fuel or Service Wagons.	Repair Wagons.	Squad Wagons.	Water Towers.
Indiana (Continued)																
Kendallville	....	....	....	....	7	....	....	....	....	7	....	....	....	....	....	....
Kokomo	20	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
La Fayette	14	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Martinsdale	....	12	....	....												
Richmond	12	8	....	8	1½	....	....	....	1½	....	....	....	....	....	....	....
Terre Haute	16	....	....	....	....	....	....	....	15	....	....	....	....	....	....	....
Vincennes	12	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Wabash	....	5	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Warsaw	....	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Wasmington	....	....	8	....	....	....	....	....	....	....	....	....	....	....	....	....
Iowa:					....	....	....	....	....	....	....	....	....	....	....	....
Cedar Rapids	14	3	....	3	....	....	....	....	....	....	....	....	....	....	....	....
Davenport	8	7	....	5	....	7	5	....	6	....	....	....	....	....	....	....
Denison	....	15	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Fairfield	....	5	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Keokuk	....	....	....	4	....	....	....	....	....	....	....	....	....	....	....	....
Lemars	....	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Mason City	15	....	....	12	4	....	....	....	....	....	....	....	....	....	....	....
Muscatine	....	3-8	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Oelwein	....	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Kansas:																
Cherryvale	....	....	....	....	....	25	....	....	....	....	....	....	....	....	....	....
Fredonia	....	....	16	....	....	14	....	....	....	....	....	....	....	....	....	....
Independence	10	....	....	....	16	7	....	....	....	....	....	....	....	....	....	....
Kansas City	10	6	....	6	....	7	....	....	5	....	....	....	....	....	....	....
Newton	..	....	....	....	3½	....	....	....	....	....	....	....	20	....	....	....
Olathe	....	12	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Parsons	12	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Topeka	12	11	....	11	....	....	....	....	....	....	....	....	....	....	....	....
Kentucky:				18												
Harrodsburg	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Henderson	10	....	....	....	5	....	....	....	....	....	....	....	....	....	....	....
Lexington	10	8	....	5	5	..	....	....	....	....	....	....	....	8	....	....
Maine:																
Augusta	....	....	....	....	3	....	....	....	....	....	....	....	....	....	....	....
Portland	10	....	3	....	....	....	4	....	3	....	....	....	....	....	....	....
Skowhegan	....	5	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Massachusetts:																
Beverly	18	....	18	15	....	....	....	....	....	....	....	....	....	....	....	....
Brockton	12	5½	....	5	....	....	5	....	5½	....	..	5½	....	....	6	....
Cambridge	14	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Gardner	10	6	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Hingham	10	....	....	....	....	....	....	....	10	....	....	....	....	....	....	....
Lowell	....	....	7	....	7	....	....	7	....	....	....	....	....	....	....	....
Ludlow	....	....	3	....	....	....	....	....	....	....	....	....	....	....	....	....
Lynn	10	....	....	....	....	....	....	....	2	....	....	2	....	....	8	....
Malden	10	8	10	9	....	....	....	....	....	....	....	....	....	12	....	....
Middleboro	....	8	....	....	....	15	....	....	....	....	....	....	....	....	....	....
Milton	10	5	....	4	....	....	....	....	4	....	....	....	....	....	....	....
North Andover	....	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....
North Easton	....	8	....	8	....	....	....	....	....	....	....	....	....	....	....	....
Quincy	11	9	8	....	....	8	....	....	....	....	....	....	....	....	....	....
Reading	....	5	....	4	8	....	....	....	....	....	....	....	....	....	....	....
Revere	....	....	....	....	....	....	....	....	10	....	....	....	....	....	....	....
Salem	14	5	8	....	....	....	....	....	5	....	5	....	....	....	....	....
Somerville	9	....	var.	8	....	....	2	....	7	....	....	....	....	....	....	....
Waltham	5½	3	....	....	....	....	....	....	1	....	....	....	....	....	....	....
Watertown	11	6	....	9	9	....	....	12	....	....	....	....	....	....	....	....
Wellesley	....	5	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Westford	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Winthrop	....	8	....	8	....	....	....	....	....	....	....	....	....	....	....	....
Worcester	9	4	4	4	3	4	....	....	3	....	3	....	....	....	....	....
Michigan:																
Albion	....	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Alpena	8	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Ann Arbor	....	....	....	....	....	....	....	....	4	....	....	....	....	....	....	....
Greenville	....	15	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Iron Mountain	....	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Lapeer	....	....	....	....	10	....	....	....	....	....	....	....	....	....	....	....
Pontiac	12	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....

(To be concluded)

The WEEK'S NEWS

Scranton's Street Workers on Strike—New York Highway Financing—Wanaque Development Cost Increased—Fuel Administration Orders "Lightless Nights"—Heating Standard for Massachusetts Gas Companies—Fires in Mullens, W. Va., Atlantic City and New York City—Fire Hazards of Chemical Handling in New York City—Washington's Garbage Problems—High Cost of Removing New York's Snow—Bonds for Jitneys Upheld by Washington State Court—California Regulates Auto Buses—Progress of New York Zoning System.

ROADS AND PAVEMENTS

Street Workers Strike.

Scranton, Pa.—About two hundred employes of the department of public works went on strike as a result of the refusal of council to increase their wages to keep pace with the cost of living. The men resent the increases given the higher salaried employes. They ask for a raise of 50 cents a day. The men went out when a ten-inch snow was on the ground after a blizzard and traffic was tied up in the business section of the city. Ashes and garbage accumulations also caused great inconvenience.

City Wins in Paving Suit.

Ogden, Utah.—Property owners who tried to prevent the city from paving streets in one of the city's districts have lost their appeal in the supreme court. They contended in their proceedings against the city that enough petitioners had signed a protest to stop the paving. The city had held that the petition did not have sufficient signers. The decision upholds the city in considering the frontage of the railroads a part of the total frontage on the street, setting out that the railroad company pays taxes and is therefore to be considered the same as all other taxpayers. Rejection of other property by the city is upheld on various grounds. These are instances where the property title rested with other persons than those claiming ownership, but who were not shown by the records of the county to actually and legally hold full title. There is an instance where an individual signed for a corporation, although not specifically authorized to do so.

Financing New York State Highways.

Albany, N. Y.—A recent statement by state comptroller Travis follows: "The new announcement of the preliminary steps taken by the state towards its acquisition of the few remaining toll bridges recalls the methods of a century ago, when state aid for highway improvement first took the form of granting charters to bridge and turnpike companies. These corporations were allowed to collect toll for repairs and profits. The state regulated the rates, and in some instances maintained them. Whenever their charters expired the roads and bridges became free, and less than a half dozen now survive. About twenty year ago a new epoch began when the state undertook the construction of a number of macadam roads, the cost being apportioned between the state, county and towns upon a 50, 35 and 15 per cent basis. As a substitution for the antiquated practice of working out the road tax, when each town abandoned the road labor plan and paid its highway tax in cash, the state contributed one-quarter of the amount. "Ten years afterward the road labor scheme was given up altogether and last year state comptroller Travis paid to the several towns, as state aid, $1,950,575.85, while the total amount contributed since 1898 amounted to $17,475,733.09." All of the first highway bond issue of $50,000,000 has been expended, and of the second $50,000,000, issued in 1912, practically all has been spent or pledged. Because of the policy adopted of disbursing the first bond issue in building short disconnected stretches of road a special appropriation of $14,955,000 was made necessary for the purpose of connecting some of these scattered pieces of roadway. In this way effort was made to connect up with through routes the numerous short patches of improved roads upon which the first great highway bond issue had been expended. When the second $50,000,000 bond issue was approved the law provided that it be apportioned among the counties according to population, area and mileage of improved highways, $20,000,000 being apportioned for the state and $30,000,000 for county highways. In order to safeguard the issuance of such securities and discharge the principal and interest, however, the state constitution requires the maintenance of sinking funds. This amounts to only two per cent per annum, the minimum low rate being intended, doubtlessly, to provide for sinking funds at the time of payment, fifty years from the time approved. Perhaps the most significant act on the state's part in aiding the good roads movement, however, arose in connection with the method of financing its share. Up to 1905 it had been the state's practice to pay for these improvements out of the annual receipts of the treasury. But the fallacy of including such expenditures soon became apparent, and after that time New York decided upon the policy of providing the necessary moneys by the creation of a state debt. It was pointed out that this outlay is for the benefit of the people of the state and in no sense to be considered an ordinary expenditure." It was therefore eminently proper that these costs should be distributed over a long period of years. Briefly described, the issuance of these securities proved to be a device whereby this commonwealth was enabled to spread over a series of years payments exceeding already over $1,200,000,000, which amount would otherwise have to be met out of current taxes. In substance, such is the scheme whereby New York has been enabled to practically rebuild its highways, a practice justifiable because these improvements will be inherited by coming generations, and it is only just and reasonable, therefore, to ask them to share the burden of expense."

SEWERAGE AND SANITATION

International Health Board Aids County.

Winston-Salem, N. C.—The Forsyth county commissioners have entered into a contract with the state board of health and the International Health Board of the Rockefeller Foundation for their co-operation in the extension of plans for public health work in the couny for a period of three years. Dr. Washburn, of the Rockefeller Foundation, who is in this state working under the state board of health, stated that the arrangement means that with practically the same appropriation for health work in the county, including a normal increase in expenditure as will occur from year to year as the county grows, the county is able to extend its work and install equipment and systematize the work to produce definite results from life extension plans in Forsyth. In addition to maintaining the work that is already being done by the Forsyth health department, an effective campaign to eliminate soil pollution will be added the first year, together with effective quarantine and disinfecting regulations and a more effective system in the school health work unit. The second year special effort will be directed at general life extension work, and the infant hygiene unit will be inaugurated during the third year. Dr. Washburn pointed out to the board that vital statistics show that 150 infants die annually in Forsyth from what are considered preventable diseases, and that 262 children under five years of age died in 1915. He also pointed out that in adult life deaths occur from diseases that can be largely prevented

after the soil pollution unit has gotten its work well under way in the county. He explained that the early work of the reorganized health department for the county will be laying the foundation, through rural sanitation and education of the people, for effective work by the general life extension unit and the infant hygiene unit, neither of which will be successful without the operation of the soil pollution unit for a period. Through the co-operation offered by the Foundation and the state department the county will spend on an average of $3,500 as the maximum, in addition to which the county will receive from the state board an average of about $2,500 a year for the three-year period. It was pointed out that all told more than $6,000 will be spent in county health work, which will complete the foundation for efficient life conservation in the county, nearly half of this being appropriated from the Rockefeller fund.

Wants Federal Control of Vital Statistics.

Washington, D. C.—Federal control and supervision of birth and death registration to supplant the present state and municipal systems is recommended by Sam L. Rogers, director of the census. "I have come to the conclusion," Mr. Rogers says, "that by far the most satisfactory and effective means to hasten the day when the entire United States shall have adequate registration would be afforded by placing the matter entirely under Federal control and supervision."

Franchise for Sewage Sludge Sale.

Canton, O.—Homer C. Briggle, of the O. C. Barber company, has been granted a franchise by the city board of control which will permit him for the next twenty years to remove the sludge from the beds of the sewage disposal plant, south of Canton. Briggle will pay only $1 to the city for the franchise, according to the terms under which it was let, but the city reserves the privilege of rescinding the franchise at any time for a price to be agreed upon by an estimating board. The city inserted this clause in case Briggle finds that he can develop a profitable business by converting the sludge into fertilizer.

WATER SUPPLY

Fix Minimum Water Pressure.

Rutherford, N. J.—Water pressure of thirty pounds at the highest levels has been set as the minimum for Rutherford by the public utilities commission. The figure was chosen as satisfactory for both the town and the Hackensack Water company, whose representative attended a hearing before the commission. Superintendent D. W. French of the water company testified that the pressure probably would range from thirty-three to forty-five pounds as soon as projected improvements are made. On behalf of Rutherford, town counsel G. L. Fake told the commissioners that the town's desire was to have a certain minimum fixed by the commission, so that the town officials could proceed on this knowledge in considering fire protection. Superintendent French explained that a minimum pressure of thirty pounds at the highest levels would mean correspondingly greater pressure at the average lower levels. Adjustment of pressure questions in Ridgefield Park, Bogota and Edgewater have also been completed.

Value Includes Improvements from Profits.

Reynoldsville, Pa.—Whether municipalities which take over water plants should be compelled to pay simply the amount actually invested by stockholders in the company, or pay the amount invested by the stockholders, plus plant investments made from earnings, is the issue in the Reynoldsville Water Company case decided by the public service commission. The commission holds that the borough must pay the water company the amount of the original investment, plus investments made from earnings, and 10 per cent annually upon these two items, from which total cash and bond dividends are subtracted, making the total to the water company $78,394.40. From this opinion commissioner John S. Rilling dissented, holding that the payment to the water company should be only $12,000, the original sum invested. The point on which commissioner Rilling differs from his colleagues is on the meaning of the clause in the act of 1874, whereby the Legislature provided that a municipality taking over a water plant should pay for it "the net cost of erecting and maintaining the same, with interest thereon at the rate of 10 per cent per annum, deducting from said interest all dividends theretofore paid." The commission rules that "the net cost of erecting and maintaining the works is the entire amount which has been wisely expended, and it makes no difference whether the money came from the investors or from earnings of the property. The earnings of the past belong to the corporation and could at any time have been paid out in dividends. Instead the owners wisely reinvested a part of the earnings in the property, and they are entitled to these reinvested sums as fully as if they had taken out the money in dividends."

Cost of Wanaque Development Increased.

Newark, N. J.—An estimate of the cost of developing the Wanaque watershed for Newark and Paterson, presented to the North Jersey District Water Supply Commission by its engineer, Morris R. Sherrerd, shows a total of $9,047,250, which is an increase of $448,750 over the estimate as submitted last summer. The new figure was made necessary by increased cost of labor and material. In addition to the increased cost of construction, Mr. Sherrerd figures that the cost of operation of the reservoir will be increased from his previous estimate of $75,000 a year to $90,000. Furthermore, he believes that if the commission constructs a pumping station and small reservoir for Paterson the cost of these will be $325,000 instead of his original estimate of $200,000. Both of these items are exclusive of the initial cost of the development. The engineer's figure of construction cost last summer was $8,598,500. In this computation it was estimated that the reservoir would cost $2,358,500 to construct. The cost of the reservoir now is placed at $3,036,000, an increase of $677,500. As a partial offset to this increase there is a decrease in the cost of the pipe line from $5,490,000 to $5,261,250, or $228,750, brought about by the elimination of the item for interest during construction. Thus the net increase is $448,750. The cost of the reservoir and pipe line construction incident to the Wanaque development, in the event that the present figures meet approval, will be equally apportioned between Newark and Paterson, or $4,523,625 for each municipality. Most of the $448,750 increase over the previous expense would be borne in the latter part of the period, within which the whole cost is to be paid.

STREET LIGHTING AND POWER

"Lightless Nights" Save Fuel.

Washington, D. C.—The United States Fuel Administration has put into effect "lightless nights" on two nights of each week. These nights are Sunday and Thursday. Under the new order the "white ways" of all cities are expected to disappear absolutely on the nights designated. The burning of lights contrary to the wording and spirit of the order will constitute a violation of law, and steps will be taken by the Fuel Administration to punish offenders. The order says: "No corporation, association, partnership, or person, engaged wholly or in part in the business of furnishing electricity for illumination or power purposes, and no corporation, association, partnership, or person, maintaining a plant for the purpose of supplying for their own use electricity for illumination or power, shall use any coal, oil, gas or other fuel for the purpose of illuminating or displaying advertisements, notices, announcements, or signs designating the location of an office or place of business, or the nature of any business, for electric searchlights, or for external illumination for ornamentation of any building, or lights in the interior of stores, offices, or other places of business, when such stores are not open for business, excepting such lights as are necessary for the public safety, or as

are required by law, nor for excessive street lighting intended for display or advertising purposes, whether such lights are maintained by the municipality or by others. These prohibitions, and all of them, are effective on Thursday and Sunday nights only, of each and every week." The only exceptions apply to lights used for governmental purposes only by the United States government or the government of any commonwealth or state, street lights used by any city or town or within any city or town under a contract with the officials thereof for such maintenance. But, it is expressly stated, no "white way" or cluster lights may be used under any circumstances. Letters received by the Fuel Administration from companies and individuals engaged in the business of supplying illuminated signs and from manufacturers, merchants, motion picture and other entertainment concerns which make large use of such signs, give assurance that the new order will become fully effective without resort to prosecution. The Fuel Administration also asks that, in compliance with the patriotic spirit of the order, householders shall observe the "lightless nights" by burning as few lights in homes as it is possible to get along with conveniently. It is said that the original Fuel Administration order on the dimming of electric signs had failed of the coal-saving result expected. That order was intended to restrict the use of fuel-consuming signs to the period between 7.45 p. m. and 11 p. m.

Thermal Standard for Gas in Massachusetts.

Boston, Mass.—After a hearing at which representatives of nearly every gas light company in the state were present, the state gas and electric light commission decided to establish the British thermal unit as the standard gas measure in place of the present candle power standard, and to request the legislature to strike from the law the candle power provision now contained in the statute. This decision comes as a result of more than a year's study by the commission's gas expert. Although expressed in calories, the unit is the equivalent of 528 British thermal units. The standard named will permit the companies to recover for the federal government the benzol and toluol substances needed for the manufacture of high explosive shells. It is the board's purpose to re-examine this question after at least six months' experience under this new standard.

Commission Revises Rates.

Indianapolis, Ind.—The state public service commission has handed down an order in the case of the Indiana Power and Water Company, which has its central station at Edwardsport, fixing new schedules of rates in many southern Indiana towns and cities. The order, in general, reduces the primary rates to consumers of electric current at Petersburg, Dugger, Bloomfield, Worthington, Odon and Elnora, and provides a slight increase at Bicknell, the latter action being taken to place the Bicknell rates on a par with those being charged by the company at Vincennes, a city where the operating costs are practically the same as at Bicknell. In the order, which establishes a precedent in many ways, the entire system of minimum charges also is revised. The primary rate to small consumers, fixed by the order, is 10 cents a kilowatt hour. Former rates to small consumers, which the new rate will supplant, were: Bicknell, 9½ cents; Petersburg and Dugger, 12½ cents; Bloomfield, Odon and Elnora, 12 cents, and Worthington, 11 cents.

The commission's order raised the minimum monthly charge for the small consumers at Bicknell from 50 cents to 75 cents; at Petersburg this charge was lowered from the former charges of $1 to $1.50, to 85 cents; at Dugger the minimum charges were lowered to 85 cents; at Bloomfield, where there had been no minimum before, a minimum of 85 cents was established; at Worthington the minimum was increased to 85 cents; at Odon the minimum was made $1, and at Elnora the minimum fixed was $1 monthly.

The new rate schedule for lighting follows:

Ten cents a kilowatt hour for first fifty hours used each month; 7 cents a kilowatt hour for next fifty hours' use of connected load; 5 cents a kilowatt hour for next fifty hours' use of connected load; 3 cents a kilowatt hour for all in excess of that, and minimum charge a month (as set out above).

The small consumer primary rate readjustments, when applied generally, will result in average decreases of from 5 to 15 per cent, the commission announced. These schedules were accompanied with the promulgation of a uniform schedule of power rates, which are extremely low, as power rates go in Indiana. The company's territory lies directly in the Indiana coal fields and the low power rates are promulgated for the purpose of giving an impetus to the movement to substitute electricity in the operation of the mines wherever possible. Already the company operates in approximately twenty towns. The commission announced that it had established the minimum charges on a basis of the population of the towns served and their consumption of electricity and also, in a few instances, that the question of the accessibility of the towns in question to the company's distributing and generating center had been taken into consideration. The action of the commission in readjusting the rates had been taken with a view to giving the company the present facilities toward developing its business, the commission said, in making the order public. All the power rates are to be made up of two charges, consisting of a demand charge and a kilowatt-hour charge. The demand charge ranges from $24 a year for "on peak" use, to $15 a year for "off peak" service. To this demand charge an energy charge ranging from 2.25 cents a kilowatt-hour for the first 1,000 kilowatts used each month to 1.25 cents a kilowatt-hour for all over 10,000 kilowatt-hours. In support of the minimum lighting charges promulgated, the commission points to the fact that the company contends it is costing it $1.40 a month to serve each individual customer. The order shows that the patrons of the company in the various municipalities "stand receptive to improved service and rate reductions, but if they are to enjoy said benefits it is also incumbent on the comparatively few patrons adversely affected to bear the slight changes that are adjudged to be reasonable."

Commission's Provisional Orders Not Subject to Review.

Bluefield, W. Va.—In a case entitled city of Bluefield against the Bluefield Water Works & Improvement Co., on the application of the water works company for permission to change water rates, in which the order of the State Utilities Commission was appealed, the court holds that "provisional orders of the Public Service Commission, valuing the property of and fixing rates to be charged by a public service corporation, for experimental purposes, and retaining the case on its docket for future action after the result of such experiment is ascertained, are not final orders, subject to the control of this court under section 16 of the public service commission act. The valuation of the property of a public service corporation and prescribing rates for tolls and charges for services to be rendered are purely legislative acts, not subject to judicial review except in so far and in so far only as may be necessary to determine whether such rates are void on constitutional or other grounds."

FIRE AND POLICE

Business District Wiped Out by Big Blaze.

Mullens, W. Va.—From a five-and-ten-cent store where it started, a fire swept the entire business section of the town and destroyed practically every building in it, doing thousands of dollars damage and rendering many homeless. A small child was burned. The fire quickly got beyond the control of the fire-fighters and dynamite was used to stop the flames from crossing the Guyan river into the residential section. The town was without fire protection and the only piece of equipment was hose in a hotel. This might have served to confine the flames had not a pole, carrying wires and current to the pumps in the hotel, collapsed and put the pumps out of commission. Governor Cornwell sent a special train with tents, cots, blankets and food to the stricken city.

Fireman Killed in Collision.

Shreveport, La.—Henry H. Hankins was killed and two other city firemen, John R. Sullivan and T. L. Franks, were injured when a combination chemical fire wagon in

being swerved to pass a Fairfield line electric car at a street intersection crashed into a telephone pole. All of the firemen on the chemical, five of them, were thrown into the street. The chemical, the left side of which struck the pole, causing the wreck, sustained considerable damage. One fender was smashed and two ladders broken. The chemical was moving down the avenue when a street car was seen standing near the intersection two blocks away. As the fire apparatus approached, the car began to turn, to the surprise of the firemen, who expected it to remain stationary until they passed. Owing to the electric car starting on the curve the motor driver found it necessary to swerve his machine, and the chemical sideswipped the pole. The street car was untouched. On it there were a number of passengers.

Red Light District Closed.

Pine Bluff, Ark.—The city council has instructed the mayor and chief of police to notify occupants of houses in the red light district that the houses must be vacated by January 1, 1918, and after that date the laws against houses of ill repute both in the segregated district and throughout the city will be enforced. In an address at the tabernacle the previous Sunday afternoon, H. H. Railey, vice commissioner of the war department, intimated that unless the people of Pine Bluff took action to abolish the red light district in this city the war department would take action, as it was known that soldiers from Camp Pike were visiting these resorts.

Reducing Fire Hazards of Handling Chemicals.

New York, N. Y.—Two important steps which will materially reduce the chemical hazard of the city, rendered doubly serious by the war, have just been taken by the fire department, fire commissioner Adamson announces. One of these relates to the storage and shipment of white phosphorus. This substance is one of the most peculiar and dangerous chemicals used in modern industry owing to the fact that it spontaneously ignites if the water in which it is stored leaks away. The amount of the chemical stored in the city has increased at a remarkable rate since the war began through the holding up of shipments. Through the accident of a leaky can on a truck filling a whole neighborhood with suffocating phosphorus fumes, commissioner Adamson discovered how large a quantity of the material was coming into the city. The code of ordinances provides that not more than 14 pounds shall be handled in one place at one time. Such large quantities were passing through the city, however, that the fire commissioner could not attempt to enforce this provision without great hardship on the industries involved. It was tried once by ordering a shipment out of the city limits; but the next morning it had mysteriously found its way back into a New York warehouse. Fire commissioner Adamson met the situation by making a cooperative arrangement with all the warehouses storing phosphorus and all the dealers using it. The commissioner gave them to understand that the only conditions under which the present rate of shipment would be tolerated were that he be notified at once of the arrival, the place of storage, the transfer and the destination of all consignments coming into New York. This agreement has been faithfully lived up to. As a result, the fire commissioner sees that each shipment is stored on the ground floor of the warehouse near a doorway, and sends a representative of the department to follow it from the warehouse to the ship on which it is to be exported. The company commander in whose district the shipment is stored is also notified of its presence and advised how to handle it in case of fire. This is because an ordinary hose stream playing on burning phosphorus merely scatters the flaming bits. It must be smothered or completely submerged in water to be extinguished. Since the average fireman is not an expert chemist, painful injuries were incurred by some of the men before these precautions were taken. The other step toward meeting the chemical situation is an amendment to the code of ordinances, regulating the storage and use of chlorine. After a recent fire, where sixty-three firemen were overcome by chlorine fumes, the fire commissioner prohibited the use of the chemical in New York city entirely. It was found, however, to be so extensively employed in laundries, etc., for bleaching, and in chemical houses, that this action was modified by preparing an amendment to the code in cooperation with manufacturers and users. The amended ordinance controls the situation. The amendment requires a permit for storing and handling liquid chlorine, and a certificate of fitness for using it. It prohibits the compressing of chlorine gas in the city. It provides that liquefied chlorine gas may only be stored in quantities specified by the fire commissioner, and regulates in detail the conditions under which it may be stored. Among other restrictions, no liquefied chlorine may be stored or used in any building used for a hotel, lodging house, tenement house or dwelling, or in any building, lot or enclosure within fifty feet of the nearest wall of a building occupied as a hospital, school, theatre or other place of public amusement or assembly.

Big "Boardwalk" Fire

Atlantic City, N. J.—The efficiency of the fire department averted a serious conflagration on the Boardwalk, when a fire destroyed a three-story building and threatened the entire block. The square is made up mostly of wooden structures, and the flames were fanned by a stiff breeze. The new high pressure water main performed its first service. Three firemen were injured. Thomas McAdams was severely burned about the body when flames burst through the roof of the dwelling on which he was stationed; George Wolsieffer was struck on the head by a falling post, and Ray Born suffered injuries to his eyes from smoke and acid. The fire started in the basement of a haberdashery shop and had gained headway before it was discovered. After more than an hour the fire was apparently under control when flames communicated to the stock of chemicals and supplies in the rear of the third floor, and the situation for a time became more serious. The loss by fire, water and smoke was estimated at $50,000.

Twenty Firemen Hurt in Explosion.

New York, N. Y.—A back draught, described by fire chief Kenlon as the worst in his experience, resulted in injury to twenty firemen and partial destruction to a cordage plant. Fire, which caused the back draught, did damage of $200,000 to the building, supposed to be fireproof. In addition to the injury to the firemen and the damage to the cordage plant the back draught spread the fire to four neighboring buildings and blew heavy metal doors many feet. When the back draught let go two top floors and the back wall of the building were blown down. Twenty-five firemen who were in the ground floor hallway of the building awaiting orders were sent flying to the street. The fire caused three alarms to be turned in and the summoning of chief Kenlon, two deputy chiefs, thirteen engine companies, four truck companies, three fireboats and two ambulances. Deputy chief Binns was knocked down by the force of the back draught but was not hurt. He picked himself up and directed the work of his men so effectively that the fire, after more than an hour's fighting, was under control. Engineer Mangles was standing in the street near his engine when a heavy piece of debris, propelled by the draught, struck his metal helmet, crushing it and jamming it down over his face. He sustained a serious scalp wound. A large piece of glass penetrated the three coats which John Roth, chauffeur for chief Binns, was wearing and lodged in his back. The building in which the fire occurred was believed by its owners to be absolutely fireproof. Recently $25,000 was spent in installing heavy iron doors, metal shutters, wire-meshed window glass and iron staircases. So strong were the fireproof doors and stairways that the firemen had to use battering rams and other implements to break them down. Work of the firemen was considerably hampered in this way. Spontaneous combustion among some bales of cotton is believed to have caused the fire. Gas generated by some materials in the building and set ablaze by the fire is held responsible for the back draught.

STREET CLEANING AND REFUSE DISPOSAL

Asks Citizens to Burn Garbage.

Asheville, N. C.—For the past few weeks commissioner Stikeleather has been considering ways and means of reducing the work required of the city teams in hauling trash, cinders, garbage, etc., from the business and residential sections of the city, and eventually he decided that the only solution of the matter was an appeal to the patriotism of the housekeepers to burn their garbage. He said: "It is absolutely essential that the city keep the schools and other city buildings supplied with coal, and as it is evident that we will have to haul our own coal all this will require teams which the city does not own. The establishment of the municipal woodyard, which will, I hope, be in operation within a short time, will also call for teams to haul the wood. By this means we will be able to furnish people with wood who could not obtain it under other conditions. A patriotic appeal to the women of the city to burn their own garbage was the most feasible solution. If they will burn their garbage and only call for a wagon when a load of it has accumulated this will release a number of the teams for other purposes. A similar appeal will be made to the men in the business sections of the city." Commissioner Stikeleather recently issued the order to the drivers on all the garbage and trash wagons, to become effective at once, that "no cinders will be hauled by the wagons in the residence districts, and property owners will please take notice that cinders will only be removed when a wagon-load has accumulated and been placed at some accessible point. This order has become necessary because of the fact that cinders are very damaging to the grates in the incinerator, making it necessary to replace these grates. Cinders are exceedingly good for walks and drives, but utterly useless and damaging when an attempt is made to burn them. Where the property owners persist in mixing cinders with trash and garbage, drivers have orders not to remove same, and property owners will be required to have same removed in some other manner, or to have the cinders separated from the trash. The city will gladly remove trash and garbage, but cinders, to begin with, are not a sanitary nuisance, and, as before stated, are very damaging to grates in the incinerator, and besides it is very poor economy to haul cinders from one to two miles to reburn them."

Cost of Waste Disposal Doubled.

Washington, D. C.—Garbage collection, which is costing the District about $70,000 annually under a three-year contract, which expires next June, will cost just double that amount during the coming fiscal year. To build a municipal garbage plant would now require an expenditure of nearly a million dollars, whereas this improvement could have been provided under the last estimates submitted to Congress at a cost of approximately half a million dollars. These are recent developments in the problem of the proper collection and disposal of wastes in the District, which is causing the commissioners no little concern. The estimates, which go to Congress in December, contain recommendations in regard to it. Some time ago the commissioners asked for bids for the collection of garbage on a one, three and five year basis. The Washington Fertilizer Company, holder of the present contract, was the only concern to submit an estimate, which has been accepted, in the amount of $140,000 for one year. Under the existing contract this firm is collecting all city garbage and removing it to its incinerating plant at Cherry Hill, Va., at a cost to the District of about $70,000 a year, which is thought to be the approximate cost to the company of collecting the material, its profits being derived through the sale of by-products. While regarding the increase as excessive, the District authorities had no alternative but to accept the bid, inasmuch as it is vital to the health of the community that there be no interruption of the garbage removal service. When bids were called for it was stipulated that any method for disposing of the material would be considered, but this suggestion failed to produce any competition. The new offer was accepted for one year only, with the idea that it would be possible to work out a more satisfactory arrangement by the expiration of the contract, June 30, 1919. The commissioners have been advocating the municipal garbage plan for several years, and when Congress appropriated $15,000 for the employment of an expert to investigate the advisability of establishing such an institution here the fight was thought to have been half won. An expert was employed, and after thoroughly investigating the proposition he reported that a municipal plant would save the District money. In fact, he estimated that such a plant would pay for itself in ten years. With this report as their guide the commissioners, in their last estimates, asked for an initial appropriation of about $200,000 for beginning work on the improvement, the total cost of which, it was figured, would amount to about $500,000. Congress did not include the recommendation in the District bill, with the result that the contract system is still in force and has doubled in cost in one year. As a result of the increase in cost of materials and labor it would cost at the present time close to a million dollars to build such a plant as the commissioners had in mind when they submitted their last estimates on the plan. Because of failure to obtain what was considered a fair price for the collection of miscellaneous refuse, the contract for the disposal of this class of material expiring June 30 next, the District street cleaning department is planning to do the work itself. The estimates, it is understood, request the necessary authority and funds from Congress. To do this work the department will have to employ more men and teams, and the additional cost, it is estimated, will be in the neighborhood of $30,000. This arrangement promises to be more economical than if the collections were made under the proposed contract. Contracts will again be entered into for the collection of ashes, night soil and dead animals. The present contracts expire June 30 next, and while the new bids were higher the District authorities did not consider the amounts exorbitant.

Contracts for Snow Removal in New York.

New York, N. Y.—The board of estimate and apportionment has approved the awards of contracts by commissioner of street cleaning John T. Fetherston for snow removal during the 1917-1918 season. On June 29 the board approved the terms and conditions and forms of contract and specification submitted by the commissioner for the removal of snow and ice in the boroughs of Manhattan, Brooklyn and The Bronx, as follows: 1. Borough of Manhattan, entire. 2. Borough of Manhattan, by three snow removal districts. 3. Borough of the Bronx. 4. Borough of Brooklyn, entire. 5. Borough of Brooklyn, by four snow removal districts. The form of contract approved by the borough of Manhattan proposed to continue the system employed during the past two winters, whereby the snow in the streets designated in the contracts was piled by the department's snow fighting force and the snow loaded and hauled to the disposal points by the contractor. The form of contract approved for the Bronx and Brooklyn require that the contractors pile, load and transport the snow and ice. On October 8, after advertisement, bids were received as follows: For the borough of Manhattan, entire, two bids, the lower being for 59½ cents; for the borough of Manhattan, by three snow removal districts; no bids for districts 1 and 3; the lower of two bids for Section 2, 54⅞ cents. For the borough of the Bronx, two bids, the lower being for 50 cents. For the borough of Brooklyn, entire, no bids; for the borough of Brooklyn, by four snow removal districts, one bid, 47.7 cents for the second district, and the lower of the two bids for each of the other districts as follows: district 1, 49 cents; district 3, 43 cents; district 4, 34 cents. These prices were compared by commissioner Fetherston with those of the previous season as follows:

(1) Borough of Manhattan Entire.—The contract price for last winter in the borough of Manhattan was 38.4c. per cubic yard. The lowest bid on the borough basis was 59.5c. per cubic yard (Purcell & Gilfeather), an increase of 55 per cent. over last year's price.

(2) Borough of Manhattan by Three Snow Removal Districts.—Bids were received only for the 2nd district, Man-

hattan. Thus, this form of contract is incomplete. The price asked by the low bidder (William J. Dempsey) is 43 per cent. higher than the contract price for the whole borough last winter, and the work in the 2nd snow removal district should cost considerably less than for the entire borough.

(3) Borough of Brooklyn Entire.—No bids were received for the whole borough of Brooklyn.

(4) Borough of Brooklyn by Four Snow Removal Districts.—The low bid for the 1st snow removal district is 44 per cent. higher than the borough bid last winter, and about 10 per cent. higher than the department estimate of a fair price in this locality.

Only one bid was received for the 2nd snow removal district, and the price asked is 40 per cent. more than the borough contract of last winter, and 7 per cent. higher than the department estimate of a fair price.

The low bid in the 3rd snow removal district is 26 per cent. higher than the borough contract for last winter, but is 4 per cent. below the department estimate of a fair price.

The low bidder for the 4th snow removal district asked the same price as the borough contract for last winter. When this fact was called to the attention of the bidder he agreed that the price was low, but stated that he would accept the award and carry out the contract.

It is probable that a readvertisement of contracts for the 1st and 2nd snow removal districts will result in lower prices, while the low bids for the 3rd and 4th snow removal districts are below department estimates of a fair price for the work.

In the case of the borough of the Bronx, last winter the department hired trucks and hauled snow in the Bronx directly, and performed the work satisfactorily at 29 cents per cubic yard. The low bidder this year asked 67 per cent. more than the cost to the city on the basis of last winter's record. Commissioner Fetherston reported as follows: "Each one of the low bidders was given an opportunity to explain the basis of his bid price, and the department computed a fair contract cost for the work, taking into consideration an increased cost of 50 per cent. for labor and 20 per cent. for hauling in all boroughs. After full consideration of all factors involved, no changes in labor rates or in the cost of hauling were secured which would approve an increase of 55 per cent. in Manhattan over last winter's prices, especially in view of the fact that Brooklyn contractors will be required to pile, load and haul the snow, while according to the specifications the Manhattan contract requires only loading and hauling, the piling to be performed by city forces." The contracts for districts 3 and 4 of Brooklyn were awarded at 43 and 34 cents per cubic yard respectively and in the Bronx the department was authorized to perform the work directly by employing labor and trucks instead of by contract. The work for the borough of Manhattan and for districts 1 and 2, Brooklyn, was readvertised and bids were received, as follows: For the borough of Manhattan, entire, two bids, the lower being for 44 cents; for the borough of Manhattan, by three snow removal districts, two bids for section 1, three bids for section 2 and one bid for section 3, all higher than 44 cents; for the borough of Brooklyn, two bids for district 1, the lower being 48.2 cents; for district 2 one bid at 44.7 cents. According to Commissioner Fetherston "the new bids represent a substantial reduction from the former bids and agree very closely with what the department estimates to be fair rates for the work in the sections bid under present labor and market conditions." The commissioner's recommendations were followed. Contracts were authorized for Manhattan, entire, at 44 cents a cubic yard, for district 1 in Brooklyn at 48.2 cents and in district 2 at 44.7 cents per cubic yard.

TRAFFIC AND TRANSPORTATION

Upholds Bonding of Jitneys.

Seattle, Wash.—The state supreme court has again affirmed its two previous decisions sustaining the jitney bond law and has refused to grant about 200 jitney drivers in Seattle an injunction to prevent Alfred H. Lundin, prosecuting attorney for Kings County, from enforcing the permit law against operators of jitneys in the city. To do so would be to amend the act of 1915, under the guise of construing it, says the decision. The jitney men claim that they are unable to procure the required bond, after the failure of the company that first indemnified jitneys, unless the secretary of state is compelled to accept the bond of the Mutual Union Insurance Company, organized by jitney men of Seattle. This company was refused authority to write surety bonds on the amount of security it was able to furnish to the state insurance commissioner. Subsequently the supreme court upheld the insurance commissioner in this view. The court holds that if the jitney men cannot obtain the kind of bond defined by the statute, they are not entitled to privileges of using the streets.

Extend Freight Hauling by Trolleys.

Chicago, Ill.—Representatives of a score of electric interurban lines have decided, at a meeting here, to form through lines to relieve the freight congestion in the Chicago district and to enter into competition with the steam roads. For the first time there are to be through cars on electric roads and they will begin by establishing fast freight service, both carload and less tha carload, and Indianapolis.

Stringent State Regulations of Auto Buses.

Sacramento, Cal.—The state railroad commission has issued a sweeping order regulating auto passenger and freight traffic throughout the state. The commission's regulations affect all stages operated outside cities or towns, but not the local jitneys running entirely in municipalities. According to the commission, time tables must be adhered to strictly. Changes affecting reduction in the amount of passenger service or the number of trips must be submitted to the commission thirty days before the change becomes effective. Unless specially authorized, no passenger motor vehicle may be operated with a trailer or any other vehicle attached unless the vehicle becomes disabled and is towed. The regulations ban the use of liquor or smoking tobacco by any driver or operator while driving a car containing passengers. Other regulations aim at the elimination of ticket scalpers. Refunds are prohibited, and uniform rates and classifications are to be established so that no discrimination can be made. Public hearings were held by the railroad commission at its investigation of the public automobile business under its jurisdiction, and an exhaustive study made of the subject by experts during the past year. The commission says that auto bus transportation has come to stay, and that properly developed, it will become a very necessary public convenience. Some of the other rules follow:

Every motor vehicle must be equipped with a standard speedometer maintained in good working order.

Every motor vehicle used in the transportation of passengers and having a top or operated with a top up is required to maintain one or more lights of not less than two candle-power, each within the vehicle, and so arranged as to illuminate the whole of the interior, and are to be kept constantly lighted between the hours of sunset and sunrise at all times when the vehicle is occupied by passengers.

Every passenger-carrying motor vehicle is required to be equipped when leaving either terminus with at least one extra and serviceable tire.

Every motor vehicle must be equipped with satisfactory brakes, and such brakes must be maintained at all times in good condition and with a braking power sufficient to lock the rear wheels whenever the brakes are fully applied and the vehicle is operated at a speed of ten miles an hour.

Passenger vehicles must carry a set of skid chains, the same to be applied to the rear wheels of the vehicle whenever necessary, to prevent skidding.

Motor vehicles must be equipped with a suitable horn or other warning device. Such as are used for the transportation of passengers must be equipped with a liquid fire-extinguisher approved by the Railroad Commission and kept in satisfactory operating condition.

Drivers of motor vehicles must be at least 21 years of age, of good moral character, fully competent to operate the vehicles under their charge, and hold a license from the State Motor Vehicle Department as required by the Motor Vehicle Act.

No transportation company shall require or permit any driver or operator to be or remain on duty for more than ten hours in any twenty-four-hour period.

No person or persons offering themselves at a regular stopping place for carriage, and who tender the regular fare to any regular stopping place on the route of any motor vehicle or between the termini of such route can be refused passage unless at the time of offer all seats in the vehicle are fully occupied. Drivers or operators may refuse transportation to any person who may be intoxicated, or whose conduct is boisterous or disorderly, or who is using profane language.

No motor vehicle shall carry more passengers that the rated capacity of the vehicle as filed with the Railroad Commission. Drivers and operators are not permitted to allow passengers to ride on running boards, fenders, or any other portion of the vehicle than the seats thereof.

No driver or operator may permit or allow more passengers to be carried on the front seat of any motor vehicle than the seat is designed to carry exclusive of the driver, nor to

permit or allow any passenger to occupy any portion of the vehicle forward of the driver's seat. No more than one passenger may occupy the front seat of any motor vehicle having a touring car body, which vehicle is operated by center control.

Except when specially authorized by the Railroad Commission, no passenger motor vehicle may be operated or driven with any trailer or other vehicle attached thereto. It is permissible, however, in case a vehicle becomes disabled while on a trip and is unable to run from its own power, for the disabled car to be towed to the nearest point where repair facilities are available.

No passenger motor vehicle may carry any luggage, baggage, package, trunk, crate or other load which will extend more than eight inches beyond the running board of such motor vehicle.

These rules and regulations supersede every county or municipal rule or regulation in conflict with them, but not other laws still in effect.

The attention of transportation companies is directed to the provisions of the State Motor Vehicle Act regarding liens, also following rules of the road, speed and methods of operation.

MISCELLANEOUS

Amending New York Zoning Regulations.

New York, N. Y.—Board of Estimate and Apportionment has been holding hearings and has voted on three important amendments to the so-called "zoning resolution," passed for the purpose of "regulating and limiting the height and bulk of buildings hereafter erected, and regulating and determining the area of yards, courts and other open spaces, and regulating and restricting the location of trades and industries and the location of buildings designed for specified uses and establishing the boundaries of districts for the said purposes." The amendments sought to extend the period allowed for buildings planned prior to the time the resolution went into effect following its passage on July 25, 1916. Last May a resolution presented by the president of the board of aldermen to amend the zoning resolution so as to extend the time for one year was referred to the Committee on the City Plan. Two months later, after a public hearing, a resolution presented by the committee failed of adoption, and the hearing was continued to September 21, which was also fixed as the date for a hearing on the resolution offered by the president of the board of aldermen. A week later the resolution offered by the president of the board of aldermen was lost and the hearing on the resolution recommended by the Committee on the City Plan was continued. The committee's amendment was as follows:

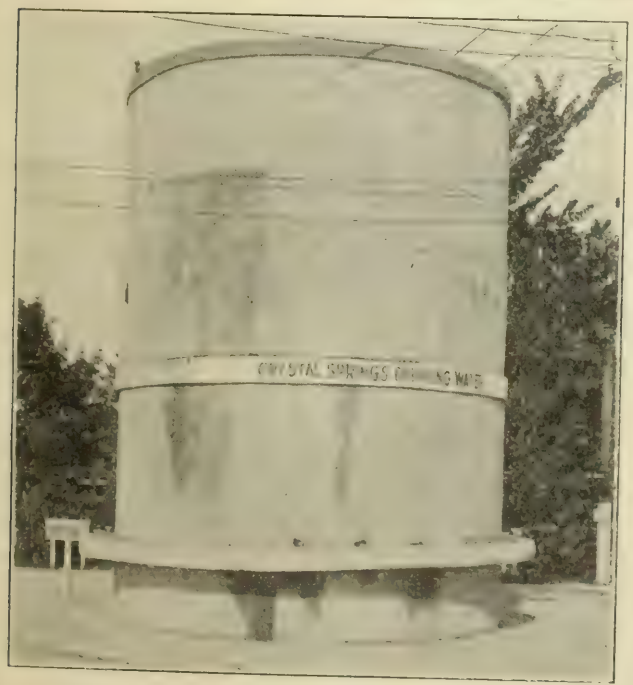
"The Board of Appeals may, after public notice and hearing, extend for not to exceed six months, the time within which such ground-story framework, including the second tier of beams, shall be completed in any case where in the judgment of said board actual construction or fabrication was begun early enough to allow under the then existing conditions adequate time for completion as above specified, and where such construction or fabrication was diligently prosecuted and where such completion has been prevented by conditions impossible to foresee and beyond the control of the owner and builder."

By representatives and letters, the zoning committee of the City Club, the Brooklyn Board of Real Estate Brokers and the Fifth Avenue Association favored the amendment, while the Real Estate Board of New York and the Brooklyn Civic Club were opposed. The defeated resolution presented by the aldermanic president read as follows:

"Completion and Restoration of Existing Buildings. (a) Nothing herein contained shall require any change in the plans, construction or designated use of a building for which a building permit has been heretofore issued or plans for which are on file with the Building Superintendent or with the tenement house department at the time of the passage of this resolution, and a permit for the erection of which is issued within three months of the passage of this resolution, and the construction of which, in either case, shall have been diligently prosecuted within a year and six months of the date of such permit, and the ground story framework of which, including the second tier of beams, shall have been completed within such year and six months, and which entire building shall be completed according to such plans as filed within five years from the date of the passage of this resolution; provided, however, that any plan, other than a plan for a garage for more than five motor vehicles, filed with the Building Superintendent or with the tenement house department on July 26 or July 27, 1916, and a permit for the erection of which is issued prior to December 25, 1916, shall be deemed to have been filed at the time of the passage of this resolution."

The Fifth Avenue Association and the Brooklyn Civic Club opposed this amendment and the Real Estate Board approved. Marcus M. Marks, borough president of Manhattan, presented a resolution making an amendment similar in wording to the first but extending the time one year instead of six months. The Brooklyn Civic Club opposed this, while the Real Estate Board and the Fifth Avenue Association were in favor. This amendment was approved by the board of estimate.

Meanwhile an interesting legal decision has recently been handed down in which the operation of building restrictions similar to those of the zone plan was involved—in this case, however, restrictions by agreement among property owners. Supreme court justice Dugro, who heard the $250,000 suit of August Heckscher, realty operator, against Edmund L. Baylies, for damages charged because of a letter written by Mr. Baylies which caused George Backer, builder, to change his mind about buying a certain property, dismissed the complaint. Mr. Backer, who was the chief witness for Mr. Heckscher, admitted receiving the letter from Mr. Baylies warning him that the Havemeyer property was covered by the Murray Hill restriction and assuring him that J. P. Morgan and other property owners in the neighborhood would go to law if he carried out his plan to erect a loft building there, but said he backed out because of the suggestion of the Morgan opposition and not on account of the alleged restriction which, he said, he didn't think would hold. Since the suit was based on the allegation that the restriction threat was the cause of the alleged damage, the court held that no cause of action was proved. The defense was prepared to offer testimony that Mr. Heckscher really lost nothing, and actually gained when the sale to Mr. Backer fell through, because the property is worth more now than the price at which Mr. Heckscher planned to sell it.



DRINKING FOUNTAIN IN LINCOLN, NEB., PARK.

Large Public Drinking Fountain.

Lincoln, Neb.—The accompanying illustration shows what is claimed to be the largest sanitary drinking fountain of its kind. It is located at Capital Beach Park in this city. The fountain is made of concrete, finished in stucco and the whole improvement was carried out at a very reasonable cost. Crystal Spring water is served instead of city water. There is a storage and pressure tank in the upper portion of the fountain, the water being carried down from this tank to a coil which fills the entire bottom of it. There are 26 bubblers connected to this coil of the "Yale" type made by the Glauber Brass Manufacturing Co., Cleveland, O. There is a door in the side (not shown) about three by five feet, through which ice is loaded into the fountain, on top of the coil but beneath the storage or pressure tank, this intervening space being about six feet.

NEWS OF THE SOCIETIES

Calendar of Meetings.

Dec. 26-29.—AMERICAN POLITICAL SCIENCE ASSOCIATION. Annual meeting, Philadelphia, Pa. Secretary, Clinton J. Swartz, Trenton, N. J.

Dec. 27-29.—AMERICAN SOCIOLOGICAL SOCIETY. Annual meeting, Philadelphia, Pa. Secretary, Scott E. W. Bedford University of Chicago, Chicago, Ill.

Jan. 3, 4.—NEW JERSEY STATE LEAGUE OF MUNICIPALITIES. Annual convention, Trenton, N. J. Secretary, Clinton A. Swartz, Trenton, N. J

Jan. 8.—CANADIAN SOCIETY OF CIVIL ENGINEERS. Annual meeting, Montreal, Can. Secretary, Fraser S. Kieth, 176 Mansfield ntreet, Montreal.

Jan. 9.—NEW ENGLAND WATER-WORKS ASSOCIATION. Annual meeting, Boston, Mass. Secretary, Willard Kent, 715 Tremont Temple, Boston.

Jan. 12.—NORTHWESTERN SOCIETY OF HIGHWAY ENGINEERS. Annual meeting, Benson Hotel, Portland, Ore. Secretary, C. G. Reiter, Hillsboro, Ore.

Jan. 14.—AMERICAN INSTITUTE OF CONSULTING ENGINEERS. Annual meeting, New York City. Secretary, F. A. Molitor, 35 Nassau street, New York.

Jan. 15-17.—VIRGINIA GOOD ROADS ASSOCIATION. Seventh annual convention, Richmond, Va. Secretary, C. B. Scott, Richmond, Va.

Jan. 16-17.—AMERICAN SOCIETY OF CIVIL ENGINEERS. Annual meeting, New York City. Secretary, Charles Warren Hunt, 29 West 39th street, New York.

Jan. 22-24.—AMERICAN WOOD PRESERVERS' ASSOCIATION. Annual meeting, Chicago, Ill. Secretary, F. J. Angier, B. & O. Railroad, Mt. Royal Sta., Baltimore, Md.

Feb. 4-7.—AMERICAN ROAD BUILDERS' ASSOCIATION. Fifteenth annual convention, Hotel Statler, St. Louis, Mo. Secretary, E. L. Powers, 150 Nassau street, New York City.

Feb. 6-13.—FIRST CHICAGO CEMENT MACHINERY AND BUILDING SHOW. Supersedes annual Chicago Cement Show. Held at the Coliseum, under direction of the National Exhibition Co.

Feb. 7-9.—AMERICAN CONCRETE INSTITUTE. Annual convention, La Salle Hotel, Chicago, Ill. Secretary, H. B. Alvord, 27 School street, Boston, Mass.

Feb. 8-9.—AMERICAN CONCRETE PIPE ASSOCIATION. Annual convention, Sherman Hotel, Chicago, Ill. Secretary, J. H. Libberton, 208 S. LaSalle street, Chicago.

March 17-24.—PAN-AMERICAN CONGRESS ON CHILD WELFARE. Montevideo, Uruguay. Secretary, Edward N. Clopper, 105 East 22d street, New York, N. Y.

April 15-17.—UNITED STATES GOOD ROADS ASSOCIATION. Annual convention, Little Rock, Ark. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

April 18-19.—BANKHEAD NATIONAL HIGHWAY ASSOCIATION. Annual meeting, Little Rock, Ark. Secretary, J. A. Rountree, 1021 Brown-Marx Bldg., Birmingham, Ala.

American Road Builders' Association.

It has been decided to hold the fifteenth annual convention of the American Road Builders' Association at the Hotel Statler, St. Louis, Mo., during the week, February 4 to 7, 1918. In view of the influences that have hampered highway construction during the past year or more and the vital need of a system of road transportation to relieve the already overburdened railways, the coming meeting promises to be the most important in the history of the organization.

Owing to the difficulties of railroad transportation, it is felt by the association that it should make no plans which would in any way interfere with the transportation of materials needed for war purposes. It has been decided, therefore, to abandon for this meeting the great exhibition of road building machinery, materials and appliances which, for a number of years, has been an important feature of the association's conventions, and to limit the good roads' show in connection with the forthcoming convention to such display of materials, models, photographs, literature, etc., as can be shown in the large ball room of the Hotel Statler. Another year it is hoped that conditions will warrant holding the usual exhibition of machinery and materials.

While the convention program is only in a formative stage at present, sufficient acceptances have been secured to assure the attendance of speakers of international reputation in their respective lines. In addition to the technical men, it is planned to have leaders in financial and business circles address the convention on the commercial side of road building, and, if conditions permit, it is expected that government officials will also speak. The aim, in fact, of the committee in the preparation of the program will be to emphasize the importance of road improvement not only as a state and nation-wide problem, but as a vital factor in national preparedness.

American Society of Mechanical Engineers.

A "war-time convention" of the American Society of Mechanical Engineers was held in New York City at the Engineering Societies' building, December 4 to 7. All the sessions were marked by a spirit of dedication to the national service and helpfulness in the solution of war-time problems which are fundamentally engineering.

On Tuesday evening, at the election of officers, Charles T. Main, of Boston, a consulting engineer who has served in several public offices for the purpose of advancing the idea of good government, was elected president. Mr. Main was born in Marblehead, Mass., in 1856, and was educated at the Massachusetts Institute of Technology, from which he was graduated in 1876. Mr. Main has designed and supervised the construction of numerous industrial, steam-power and water-power plants, including four hydro-electric developments for the Montana Power Company, aggegating about 280,000 horsepower. Mr. Main became a member of the American Society of Mechanical Engineers in 1885 and has served on its board of managers for the past three years. He is also a member of the American Society of Civil Engineers and a number of other engineering and technical societies.

Honorary membership was conferred upon Major-General George W. Goethals, following which ex-President William H. Taft delivered an address.

On Wednesday morning the "keynote session" of the convention was held on the theme, "The Service of the Engineer to the Public in Times of Crises." Dr. Ira Y. Hollis, president of the society, delivered an address on "Universal Public Service in Peace and War." Gano Dunn, who has played a major part in establishing contact between the engineers and the war councils of the government, spoke on "The Engineering Society in National Defense." Admiral F. T. Bowles, of the U. S. Shipping Board, discussed the shipbuilding problem. Prof. L. P. Breckenridge, of New Haven, presented aspects of the fuel problem. Prof. W. F Durand, chairman of the National Advisory Committee on Aeronautics, discussed the aircraft problem. Dr. W. H. Jordan, director of the New York Agricultural Experiment Station, spoke on the agricultural problem. Major L. B. Moody, of the carriage division of the Ordnance Department, U. S. Army, spoke on the problem of army transportation, and William P. Kennedy, of New York, took up motor transportation, and methods of relieving railroad congestion by the extended use of motor trucks. Leonard Metcalf, of Boston, presented "The Solution of the Cantonment Construction Problem." C. B. Skinner, of Pittsburgh, discussed the problem of engineering research and its relation to the war, and Dr. C. S. Howe, of Cleveland, discussed special education in time of war. Other war topics discussed by prominent speakers were inspection of munitions; employment of women in munitions plants; certification of gages for munitions manufacture; conservation of fuel and industrial safety.

In the afternoon, simultaneous sessions were held: "Power Plant"; "General" and "Industrial Safety." At the last named session the following papers were presented: David M. Myers, "Preventable Waste of Coal in the United States"; W. J. A. London, "A Commercial Analysis of the Small Turbine Situation"; E. C. Freeland, "Bagasse As a Source of Fuel"; G. C. Thomas, "The Cooling of Water for Power Plant Purposes," and E. T. Adams, "The Steam Motor in the Automobile Field."

At the general session, the following subjects were taken up: "The Transfer of Heat Between a Flowing Gas and a Containing Flue," Lawford H. Fry; "A Study of Surface Resistance with Glass As the Transmission Medium," H. R. Hammond and C. W. Holmberg; "Apparatus for Cooling, Drying and Purifying Air," W. J. Baldwin; "Recent Developments in Balancing Apparatus," N. W. Akimoff; "Plotting Blower-Test Curves," A. H. Anderson, and "Cross-Current Predeterminations from Crank-Effort Diagrams," Louis Illmer.

In the afternoon there was a student branch conference, and in the evening a popular social feature was the smoker.

On Thursday morning, representatives of the 24 local sections of the society held a session under the direction of the sections committee for a discussion of their work. At the same time, at the general session, among others, the following papers were read: "Expenses and Accounts," H. L. Gantt, and "Combined Stresses," A. L. Hopkins.

At 10 a. m., a joint meeting of the A. S. M. E. and S. A. E. committee on steel roller chains was held. At noon, at luncheon, Prof. Dexter S. Kimball delivered an address on "The Relation of Industrial Management to Engineering." In the afternoon simultaneous machine-shop and textile sessions were held. In the evening, Dr. John A. Brashear, past president of the society, delivered his famous lecture on "The Beautiful in Commonplace Things," following which there was a reunion and dance.

On Friday morning simultaneous management and power-test sessions were held. At the former there was a topical discussion on the employment of women in the skilled industries, with particular reference to war conditions, introduced by John W. Upp, General Electric Company, and C. B. Lord, Wagner Electric Manufacturing Company. Major Frank B. Gilbreath spoke on "The Engineer, the Cripple and the New Education." The power-test committee held a public hearing, preliminary to a proposed revision of the power-test code of the society, comprising rules for conducting tests on prime movers of different types, and auxiliary apparatus.

International Association of Police Chiefs.

The twenty-fourth annual convention of the International Association of Police Chiefs, postponed from last June, was held in Washington, with headquarters at the Hotel Raleigh, December 4 to 6. The opening meeting was addressed by secretary of the treasury McAdoo and secretary of war Baker. The effects of war on police service and the means of strengthening service to meet war-time demands formed the principal subjects of discussion.

Probably the most important address of the convention was that delivered by Raymond B. Fosdick, chairman of the commission on training camp activities. He spoke of the co-operation between the army and navy officials and local police forces in eliminating vice from areas near camps. The special war-time need of a central federal bureau of criminal identification to be maintained by the government was pointed out by major Raymond W. Pullman, superintendent of police for the district.

A resolution was unanimously passed which creates a committee to urge on the interstate commerce commission an amendment of the interstate commerce law so that county sheriffs, police chiefs, superintendents and marshals engaged in the line of duty may be added to the classes who may, under that act, receive free railroad transportation.

Van H. Manning, director of the U. S. Bureau of Mines, opened the after-

(Continued on page 642)

PERSONALS

Miller, Chalmers, formerly assistant city engineer of Lorain, O., has been appointed city engineer, to succeed C. M. Osborne, who has become city manager of East Cleveland, O.

Cleary, John J., chief of police, Trenton, N. J., died recently.

Meeker, Robert A., state highway engineer of New Jersey, has resigned his position, and in spite of resolutions to the contrary passed by the State Association of County Engineers and others, his resignation has been accepted.

Joy, president Henry B., of the Lincoln Highway Association, former president of the Packard Motor Car Company, has been commissioned a captain in the Industrial Division of the Aviation Section of the Signal Corps of the United States Army. Captain Joy is now stationed in Washington, and may leave for France at any time. Captain Joy was selected among the first, in response to the call of General Pershing for one hundred executives of big business familiar with the problems incidental to the administration of affairs in the army which America is mobilizing. It is entirely probable that Captain Joy will serve with Colonel Sidney D. Waldon, a former vice-president of the Packard Motor Car Company, and a director of the Lincoln Highway Association. Captain Joy served in the United States Navy during the Spanish-American war. Not only Captain Joy, but many other directors and officials of the Lincoln Highway Association are now serving the Government in one capacity or another where their particular qualifications make them of most value. Among those included are: Vice-president Carl G. Fisher of Indianapolis, director John N. Willys of the Willys-Overland Co. of Toledo, and vice-president Roy D. Chapin, of the Hudson Motor Car Co., Detroit.

Mayor-elect Charles R. Hunter has appointed the following new officials: John Beattie, patrolman, police chief; M. L. Lee, deputy city controller; Raymond Hilleary, assistant city attorney; Carl E. Evinger, chief of the fire department; J. A. Buck, city sealer, succeeding A. E. Mogle; Carl Gott, street commissioner; Frank Richart, building inspector; Horace E. Tune, Mrs. Robert E. Lee, Don M. Nixon and S. William F. Cronin, board of park commissioners

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

An electric TRANSMISSION LINE is to be built by Fremont, N. C. The engineer is B. O. Austin.

Humboldt, Ia., is to build a SEWER SYSTEM, preliminary plans for the work having been completed by C. H. Currie.

St. Georges de Champlain, Que., is having plans prepared for an AQUEDUCT by the consulting engineer, W. Bourassa.

A REINFORCED CONCRETE BRIDGE is to be built by Anoka, Minn. The engineer for the work is L. P. Wolff.

A SEWER SYSTEM to be constructed by Marquette, Kans., is to be planned by the engineering firm of E. T. Archer & Co.

Torrington, Conn., is to build three RESERVOIRS to cost about $1,300,000. The plans are in course of preparation by the engineer, C. H. Preston, Jr.

A WATERWORKS SYSTEM is to be built by Paducah, Ky. The necessary surveys and plans are to be made by the engineering firm of Frederick W. Ballard & Co.

STREET IMPROVEMENTS to be made by New Kensington, Pa., were planned by the engineer, O. B. Higley.

Hudson, O., is making PAVING IMPROVEMENTS. The engineer for the work is M. P. Lauer.

Le Roy, N. Y., is to build a highway BRIDGE, preliminary plans having been completed by the engineer, James P. Wells.

SEWERS are to be built by Watervliet, N. Y., plans for the improvement having been drawn by the engineer, Arthur Chapman.

Shreveport, La., is to build a BRIDGE, plans for which were drawn by the engineering firm of Waddell & Son.

A new WATER SUPPLY SYSTEM to cost about $500,000 is to be installed by McKeesport, Pa. The engineer retained to prepare plans is Leo Hudson.

Plans for a SEWERAGE SYSTEM to be built by Belleville, Kans., have been completed by the engineers, Black & Veatch.

A SEWAGE SYSTEM and DISPOSAL PLANT are proposed for Wilkes-Barre, Pa. Plans and specifications for the work are being prepared by the consulting engineer, Alexander Potter.

In the controversy over the DISPOSAL OF SEWAGE from the proposed state schools on the watershed of New York city's supply, the town of Yorktown, N. Y., which favors the building of the schools, is represented at legislative hearings by Rudolph Hering as its expert.

INDUSTRIAL NEWS

Cast Iron Pipe.—Prices at all points remain the same after the recent rise. Quotations: Chicago, 4-inch, class B and heavier, $58.50; 6-inch, $55.50. New York, 4-inch, class B and heavier, $59.50; 6-inch, $56.50. Birmingham, 4-inch, class B and heavier, $53; 6-inch, $50; class A, $1 extra, all sizes.

The Amies Road Co., Easton, Pa., announces the resignation of J. L. Stackhouse, assistant secretary and auditor during the past eight years, who has become business manager of a local newspaper.

Concrete Machinery in Switzerland.

According to consular reports, concrete mixers are extensively used in Switzerland, chiefly for the construction of buildings and roads. Most of them have been imported from Germany; some are manufactured in Switzerland. Preference would be given, probably, to a medium-sized machine. On account of the high cost, only the large contractors have been able to buy such machinery, but if it is possible to bring on the market a less costly mixer, which in spite of its smaller dimensions offers the same advantages, and will render just as good service as those now in operation in this city, it will probably meet with success. (The names of wholesale dealers in and users of concrete machinery in the Zurich district may be obtained from the Bureau of Foreign and Domestic Commerce, its district or cooperative offices. Refer to File No. 95204b.) The possibilities of introducing American concrete mixers in the Geneva district are most favorable, although the demand for such machines is limited. It is urgent that dealers in the United States should employ every possible means to obtain a strong position in this market in order to counterbalance the efforts of near-by enemy countries, which have facilities for sales on account of their location. (Machine importers' names may be obtained from the Bureau of Foreign and Domestic Commerce, its district or cooperative offices. Refer to File No. 95281b.)

NEWS OF THE SOCIETIES

(*Continued from page* 641)

noon session with a paper on "The Part to Be Played by Police Departments in Enforcing New Federal Laws Regulating the Storage, Transportation and Sale of Explosives." Other government officials and army and navy officers spoke on various subjects requiring the co-operation between federal agencies and local police forces. Among those who made addresses were: Col. R. H. Van Deman, U. S. A., chief of the military intelligence division of the general staff; capt. Roger Welles, U. S. N., chief of the office of naval intelligence; A. Bruce Bielaski, chief of the bureau of investigation of the Department of Justice, and John C. Koons, first assistant postmaster general.

One of the closing sessions was devoted chiefly to moving pictures on police first aid, presented by prof. Wilbert E. Longfellow of the American Red Cross.

Chief Mooney of New Orleans urged the adoption of a cipher code by which messages from a chief to another chief or to a subordinate cannot be read by any one for whom they are not intended. "That every policeman of whatever grade should consider himself at this time a member of the military forces of the country and on the firing line of defense," was the keynote of one session, made by Harry L. Brooks, chief of police of Winton, Va. The problems of depleted forces, due to men leaving for more remunerative work in munitions plants and because of the army draft, were discussed a number of times, both in speeches and informally.

All officers of the assocation were unanimously re-elected, and Kansas City, Mo., was chosen as the place of the next convention. The officers are: President, Michael T. Long, Newark, N. J.; first vice-president, W. J. Petersen, Oakland, Cal.; second vice-president, Miliard F. Kerr, South Bend, Ind.; third vice-president, Daniel Wolff, Yonkers, N. Y.; fourth vice-president, Garrett J. Farrell, Hartford, Conn.; fifth vice-president, Col. A. P. Sherwood, Ottawa, Can.; secretary, C. G. Kizer, Norfolk, Va.; treasurer, Fred C. Roach, Jacksonville, Fla.; sergeant-at-arms, Lona B. Day, Scranton, Pa.

Major Pullman was designated a member of the executive committee and the committee on war activities of the association.

The next convention, in Kansas City, Mo., will be held at a date to be decided later.

American Association of Engineers.

A letter written by the committee on ethics and cooperation of the American Association of Engineers, Chicago, has been sent by president Edmund T. Perkins of that organization to the presidents of the various engineering societies in the United States. The letter says, in part: "Our association is not endeavoring to rival, but rather supplement existing activities and to do those things which many of the older established bodies have considered to be beyond their functions and yet which from the standpoint of the engineer as a man and a citizen should have careful consideration. It is our desire not to interfere in any way with the established customs of existing societies, but rather to cooperate and to a certain extent incite effort in the fields which so far have been hardly touched."

Arkansas Municipal League.

This organization was formed at a meeting of mayors and officials of Arkansas municipalities, held at Little Rock, November 15, in the Hotel Marion, upon the invitation of the local officials. This league is to have for its primary objective the bettering of financial and others conditions in the various cities throughout the state.

The organization will draft a set of suggestions and recommendations, and will present a resolution to the coming constitutional convention, urging the absolute necessity for some means that will better the financial condition of the various cities and towns in the state. The plan advocated is that cities be permitted to issue certificates of indebtedness, carefully restricted and safeguarded, and within certain defined limitations, these certificates to be issued only following an affirmative vote of the people.

Mayor Charles E. Taylor, of Little Rock, was elected president, and Dr. K. M. Kelly, mayor of Texarkana, vice-president.

Jefferson Highway Association.

Seven states and one province were represented at the first session of the annual meeting of the board of directors of the Jefferson Highway Association, held at Denison, Tex., November 22 and 23. D. N. Fink, president, acted as chairman of the sessions. The Texas state highway department was represented by chairman Curtis Hancock and commissioners Odle and McLean. W. A. Hopkins, Lamonia, Ia., was elected president of the association. The only vice-president re-elected was Mrs. J. L. Kimbell, of Shreveport, for Louisiana. The directors are confident that the International Highway, extending from Winnipeg, Manitoba, to New Orleans, will be completed in 1919, according to schedule and plans are under way for the construction of elaborate terminals at both cities, the New Orleans terminal to have palm trees lining both sides of the highway for a distance of 100 miles from Canal street, and the Winnipeg terminal to be a similar feature with pines and other northern trees.

Providence Engineering Society.

Seven section meetings were scheduled for the month of December for the Providence Engineering Society. Prof. Hardy Cross, of Brown university, read a paper on "How an Engineer Gets His Facts." Other meetings were held as follows: "Manufacture and Storage of the Moving Picture Film from the Fire Insurance Standpoint," Frederick J. Hoxie, special inspector, Associated Manufacturers' Mutual Fire Insurance Co.; "Driving Chain, Its Use and Limitations," J. J. White, Morse Chain Co., Ithaca, N. Y.; "Boiler Room Efficiencies," George F. Wheaton, J. & P. Coats Co., Ltd.; "Time Study," W. O. Lichtner, Sanford Thompson Co., Boston; "Rate of Precipitation and Notes on Catch Basin Maintenance," Geo. A. Carpenter, city engineer of Pawtucket, N. J.; "From the Coal Pile to the Lamp," Jesse E. Gray, chief engineer, Narragansett Electric Lighting Co.

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